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FREDERICK HOBART, CHARLES S. PALMER } ...ASSOCIATE EDITORS

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EDITORIAL.

OUR LONDON CORRESPONDENT mentions an occurrence such as is too frequent in the business of mining, namely, the adoption of a part only of an engineer's recommendations, while leaving him responsible for the entire plan of working. Mr. R. J. Frecheville recommended the directors of a fiasco, known as the San Francisco del Oro Mines, Ltd., to develop their property and to equip it on a scale measured by the expenditure of £175,000. They now proceed to raise £150,000, enough probably to equip the mine, but insufficient to include the working capital for development underground. We shall watch, with interest, the sequel of this incident. In the meanwhile, it is obvious that Mr. Frecheville cannot be held responsible for the result of recommendations that are not frankly adopted.

IT GIVES US particular pleasure to publish an article by that veteran geologist and mining authority, Mr. J. H. Collins. On another page the reader will find his description of the manner in which the kaolin of Cornwall is exploited, and we commend the article to the younger engineers as an example of clear and unpretentious technical writing. Incidentally, the etymology of 'kaolin' is worthy of mention. It is derived from Kao Ling, the name of a range of hills in China noteworthy for the occurrence of this decomposition product. Chinese in its etymology but especially Cornish in its industrial value, kaolin is one of those non-metallic minerals that play a minor, though specific, part in the arts of civilization.

THE COLLECTION of the tax on net earnings of mines, imposed by the State of Nevada, is meeting with some difficulties. The last legislature provided for the appointment of a bullion inspector, with power to visit mines, inspect their accounts and also those of smelters and railroad companies, in order to determine the shipments and their value. Whether this measure will succeed is doubtful. If a company is disposed to evade taxation, it is easy to reduce the net earnings on the books; in fact, the actual payment of dividends is the only positive evidence that can be relied upon. Even that is not always a certain rule; for we have in mind a case where the ore from a mine is worked by a separate company, and its

charges absorb the value of the ore. In this case, the mining company pays no dividends, but the milling company has large profits; and no taxes are paid.

OUR BRITISH COLUMBIAN contemporary, the *Sandon Mining Standard*, publishes a thoughtful article on the cause of the depression in the Slocan district. It is explained how the railway lines tributary to the Great Northern have taken the lead ores of the Slocan district to the American smelters, to the detriment of Canadian metallurgical industry. But a new hope has been created by the activity of the Canadian Pacific Railway and the upbuilding of a metallurgical center at Trail. It remains to be seen whether the authorities controlling this new situation will be wise enough not to exhaust the mining industry of British Columbia in a selfish effort to make money at all hazards. Railroads that are too exacting usually get punished in the fruition of events. It is to be hoped that the Great Northern and the Canadian Pacific will, by their competition, succeed in preventing each other from getting all the profit that there is in metal mining within British Columbia.

THE FORMATION of an association, which will represent the operators of the bituminous coal-mining States of the West, is a matter of importance. The new organization is composed of the commissioners and secretaries of the different State associations. Its object is to act as a means of communication among those associations, and to secure united action when necessary. It is an advisory, rather than an executive body, and its powers are not very clearly defined, so far. It is obvious, however, that such a body can be useful in many ways, and it is quite probable that time may bring an enlargement of its scope. The Western operators ought to—and many of them do—realize the necessity of union in dealing with the miners, who are represented by a single body. There is little doubt that this necessity will become clear enough to overshadow existing local jealousies and differences.

THE BILL MAKING the employment of shot-firers compulsory in the coal mines of Illinois is now a law, having been approved by the Governor. Its working will be illustrated by actual experience. We have already referred to the protest of the mine operators; a reply to this has been issued by the United Mine Workers, which refers to the additional safety under the new law; and which claims also that the cost of complying with the provisions of the law cannot be great enough to add materially to the cost of coal sold under competition. The truth, probably, is between the extreme claims made by both sides. The bill was really unnecessary, but it does not seem probable that it will do as much harm as some of the operators seem to fear. Much depends, however, on the willingness of the miners to do their work properly.

Iron Trade Conditions.

The position of the iron market and its relations to the stock exchanges have been the subject of considerable comment lately. Wall Street has been agitated by all sorts of rumors concerning depression in the iron trade, decrease of production, and similar matters. Most of these have been exaggerated, as is the custom with Wall Street, which looks rather for immediate effect upon the stock quotations, and frequently neglects to take the wider view which would make the situation clear. The fact is that the iron trade has been passing through a period of quietness which was, sooner or later, inevitable, after the extreme activity which characterized the earlier months of the year. The liberal buying, which was undoubtedly in some cases in excess of real necessities, must necessarily be followed by a lull, until actual consumption has absorbed the material. In many cases there is little doubt that the contracts closed on the rising market in the latter part of 1904, and the first months of 1905, were purposely made large in order to avoid the possibility of a sharp increase in quotations, which many anticipated. The effect of this is now apparent, and it is neither unnatural nor discouraging that there should be a decrease from the intensive production of the past quarter. An output of pig iron at the rate of 2,000,000 tons a month may be possible, but it is hardly likely that it can be kept up—or at any rate absorbed—over a series of months.

The main effect of the reaction is at present apparent in the gradual lowering of prices, but it is not probable that this will go far enough to cause a serious loss to the important steel companies. In fact, its effect is already beginning to be manifest in a slight improvement in the quantity of new business, and it is probable that this will be more apparent later. The country is generally in a good condition, and there are prospects of excellent returns from this year's crops, so that it is not likely that buying and constructing capacity will be seriously limited for some time to come. The speculative element has seized upon the reduction in prices, and, without looking beyond that, assumes the probability of a period of small earnings and light business, which is not at all warranted by the actual facts.

As an instance of the small value of rumor, we may mention the recent nominal dissolution of several pools in the steel trade, of which a great deal was made in Wall Street. The fact is that this was more apparent than real, and was done for reasons which can readily be understood in view of the present public feeling toward combinations. The change was not, and is not likely to be, followed by any cutting of prices, and it is probable that the understanding among the manufacturers of rails, bars and structural material is quite as clear and solid as when the pools were nominally in existence. No serious break in the trade is to be anticipated, and if there is a gradual lowering in prices in many lines, the effect is likely to be beneficial rather than otherwise.

The Cost of Mining.

The contributions to this discussion have not been numerous, but they have come from men entitled to speak with authority. On the main points there has been practical unanimity; for instance, the need of a simple but comprehensive system of accounts and the subordination of the cost of mining to the vital question of profit per ton of ore. Among the factors which explain the marked differences of cost made apparent by the reports of mining companies, two are specially notable; we refer to the effect of sorting and the efficiency of labor. In districts where mining operations follow small and irregular seams of rich ore scattered through a large mass of material of low grade, it is a fundamental problem whether to work the rich ore separately, obtaining a clean high-grade product, or to break down the entire mass of mineralized lode, with subsequent sorting at surface. It is a question whether the maximum profit can be secured by breaking the rich streak by itself (that is, to 'resue') or to minimize the cost of

breaking by taking the full width in one blasting operation. In the one case the expense incurred underground is greater; in the other, sorting supervenes at surface. The choice of methods will depend largely upon the contents and character of the extra width of rock broken down with the main ore-streak. Here is where the 'cost of mining' trembles in the balance. Each case must be worked out individually, according to particular conditions; and, in the weighing of the factors affecting the final profit, there comes the test of good management.

The quality of the labor employed is another basic factor. It is hardly realized, by shareholders and directors, how great a difference in the cost of mining is created by inefficient labor. In this respect the mines which are able to use the contract system and those which are free from the unintelligent tyranny of the miners' unions have a great advantage over those that are dominated by walking delegates and are compelled to employ unskillful workmen at 'day's pay.' Thus the Joplin and the Flat River districts in Missouri afford a strong contrast. Among other aspects of the labor problem, it is, we think, a safe generalization, that mine operators find it economical to make the best of whatever native labor may be available. In Korea, in Mexico, in Burmah, in most countries where the natives can be trained to do the work in mines, it is cheaper to educate them to the American or European methods than it is to introduce the high-priced workmen of more advanced communities, because the extra skill secured thereby is rarely compensation for the climatic effects on foreigners and the dependence upon men who cannot be replaced save with great loss of time and the incurring of a one-sided obligation. In all comparisons initiated between working costs obtained under labor conditions so diverse as those of the United States, South Africa, Mexico, and Western Australia, it is necessary to have regard to this factor.

In a recent issue Mr. Philip Argall made some pertinent remarks concerning the ability to discover ore in a mine as being at least as precious as that of keeping down the costs of operation after the ore has been found. He quoted an instance the identity of which it was not difficult to recognize. Undoubtedly, skill in seeking orebodies is one of the most difficult to appraise, because it must be, to a large extent, dependent upon accident; nevertheless, it is well for those in control of mines—especially such as maintain an expensive organization—to realize that no quality is so directly contributory to profitable mining as the instinct or experience that enables a superintendent to follow the ore or, when it fails, to pick up a new trail of ore deposition. That is why 'tributers' or lessees make an expensive mine management look silly when they take over a mine supposed to be exhausted and forthwith uncover valuable ore-shoots. Occasionally, the increase in output, coincident with the tributer's regime, is traceable to patches of rich ore hidden by miners previously on 'day's pay'; but, as a rule, it is simply the result of the initiative displayed by men who are no longer working for a company, but for themselves. Any method of management which utilizes this characteristic of humanity is likely to induce economy in the cost of operation.

Harvard and Technology.

The strongly adverse decision resulting from the referendum to the alumni of the Massachusetts Institute of Technology is likely to prove decisive. Out of 1,809 graduates who voted, only 458 favored the alliance with Harvard University. On another page we quote a summary of the views expressed by the 'Tech' alumni, because they present an interest wider than this controversy; they ought, for instance, to give light to those who advocate merging the Royal School of Mines with the University of London.

It will come as a relief to the friends of both Harvard University and the Institute of Technology if this vote should put an end to the unrest created by the proposal to consolidate the two institutions. The 'Tech' men have been aggressive in disapproval of a plan which owes its origin largely to the ambition of their titular chief; while the Harvard men, especially those of the Lawrence Scientific School, the future of which would be directly affected, have maintained a dignified quiet that has misled the general public into a belief that they desired the merger. As a matter of fact, the more thoughtful men on both sides have feared the consummation of a scheme which would have destroyed the solidarity and effectiveness of two technical colleges, each of which is doing excellent work in its own separate way. Education is a process broad enough to include several useful variations; the specialized instruction of a technical institute and the broader culture of a university annex both serve their purpose in the scheme of creation. These United States are big enough to afford more than one kind of training to the youth who desires to apprehend the principles and practice of science and technology. It is also fairly certain that the number of those requiring such training is great enough to demand the service of all the existing educational facilities, and of more. Despite every advance in these facilities, there is one drawback to which the huge colleges and technical schools are increasingly subject, and that is the size of the classes taught by the individual teacher. All consolidations tend to aggravate this imperfection. Emerson once lectured to a single student, but he was John Lothrop Motley, and on one occasion Playfair had a solitary pupil, but his name was Thomas Carlyle. Personality is one of the fundamental gifts of a great teacher. The direct contact of a handful of students with their professor gives results never quite attained by big classes, the members of which are not known even by name to the lecturer. The product of instruction based on manufacturing methods will never have the character of that education which is the result of individual teaching.

The Amalgamated Copper Statement.

The Amalgamated Copper Company has broken the silence which it has steadily maintained ever since its organization, by issuing a statement to its stockholders and the public. This document, which was promised for some time, has been awaited with some curiosity, though it was hardly expected that it would give a full exposition of the company's affairs. The reasons which have induced the departure from the policy of silence are generally understood; therefore, they need hardly be referred to here. A certain pressure of public opinion, and the fact that a great many statements have been made about the company, so far without contradiction, were doubtless the reasons why it was considered well to put forth something on the other side.

It cannot be said that the first report—if it can be called a report—of the company is a satisfactory document. The financial statement consists simply of a balance sheet in an extremely condensed

form. The whole sum invested in securities and other property is lumped under a single figure, and no particulars are given of the property owned, beyond a general statement of the names of the companies in which the Amalgamated owns an entire or partial interest. The amount of stock held in each finds no place in the figures. There is no statement of earnings or of expenses, the only item having any bearing on this point being the amount of the surplus and reserve fund, which may be supposed to represent undivided profits. The figures given as to dividends, and similar matters, are only those which are already well known, and the same may be said of the brief paragraphs which referred to the litigation in Montana, which has affected the company's operations ever since it was formed. A brief comment on the fluctuations in the price of copper makes no reference whatever to the attempt which was made in the first place to hold the market at its highest point, and, when that failed, to the persistent policy of the company in keeping quotations down when they showed a tendency to rise. Nothing is said as to the future policy of the company or its intentions.

A plea for the present capitalization is put forward in a statement found in one of the closing paragraphs, which compares the selling value of Calumet & Hecla and of Rio Tinto stocks with the production of those companies. This has the appearance of an after-thought, and it is surprising that a company of such importance should put forward so weak an explanation. Nothing definite is said as to ore reserves, or provision for future operations. The only reference to production is the assertion that output last year was 252,000,000 pounds of copper, of which 202,000,000 pounds were from mines operated directly.

Taken altogether, the statement has a little the appearance of a lawyer's plea in rebuttal of charges; but it would have been much more effectual if it had contained some definite figures. The stock exchange comment was a fall in the price of the company's shares.

Market Conditions.

June 7.

The metal markets continue generally quiet. In copper the consumers are still taking only moderate interest. Foreign trade is somewhat better, and there has been an advance in standard in the London market. Tin is quiet, with the usual fluctuations. Lead shows no special change. The same can be said of spelter, which is not strong.

Silver has shown only moderate fluctuations. Small demand for India has been offset by purchasing for Chinese account, and for other export to the East.

The iron trade is quiet, and the waiting attitude of buyers is still a feature in the market, which is beginning to have some effect in a lower range of prices. Conditions are more fully treated in another column.

The coal trade in the West is about the same as last week. Lake trade is moderately good, but hardly up to expectations. Local trade in the large cities is suffering from over-supply. The Pittsburg district is in better condition than the Indiana and Illinois regions. In the East, both anthracite and bituminous trades are steady and show no material changes.

Harvard and Technology.

In regard to the proposed consolidation, the Secretary of the Alumni Association of the Massachusetts Institute of Technology states that, from an analysis of the letters, over 500 in number, received from the former students with their ballots, the following considerations appear to have had special weight:

"The minority favoring the proposed agreement believe that the income from the McKay fund would relieve the financial condition of the Institute, and that association with Harvard University would broaden and liberalize the work of the school, enabling it to cope better with the changing problems of modern education and to resist the tendency to narrowness and in-breeding. Many hold that contact with the Harvard undergraduate body and the development of a dormitory system on a new site will promote the acquisition of those broad views and the development of those social talents which are of inestimable value to the engineer in the practice of his profession. Believing in the general principle of combination, they consider that the union of two educational institutions to control the field of technical education in this community would insure concentration of support, promote economy and avoid duplication. They hold that the independence of the Institute is substantially maintained by the proposed agreement; that by combination with the Lawrence Scientific School it can give to the community better facilities for training than either institution offers alone, and that it could thus be made perhaps the strongest technical school the world has ever seen.

"The majority of the alumni, however, do not find that the proposed agreement secures these in the main desirable results. It seems to them so vague and incomplete as insufficiently to safeguard the interests and independence of the Institute, even if it were not dependent on two uncertain court decisions; and to many it is repugnant as tending to divert trust funds from the ends for which they were bequeathed. On the financial side, they are convinced that the expense of moving to a costly and in some respects undesirable site and of accommodating a sudden influx of new students would for many years more than offset the income from the McKay fund; and they foresee serious financial loss from the alienation of present friends and future benefactors of the Institute. Educationally, they believe the application of the principle of business combinations is unsound; in this case the characteristic Technology spirit and atmosphere of earnest work would gradually deteriorate under the influence of an institution of alien temper and by contact with a body of undergraduates of less serious aim. They find no provision in the plan for any real economy or avoidance of duplication, since both Harvard and the Institute continue scientific and even industrial work.

"They believe that under the agreement the new institution would be weakened by a divided corporation and faculty and by its dependence upon two bodies of indifferent or hostile alumni; and that by an inevitable course of development tending to complete absorption, it would give over to the university both advanced research and the more liberal branches of undergraduate training. An established present would be exchanged for a doubtful future. If, on the other hand, this agreement is defeated and the Institute relieved from the paralyzing agitation and uncertainty of the last few years, the majority of the alumni are confident that they and other friends of Technology will find funds for its support; they believe that its curriculum may be wisely broadened by development along its own lines, rather than by an abrupt departure from them; they see many advantages in the present site if combined with the progressive development of better housing accommodations for the student body on land now available within easy reach; and they look to the enlarged Lawrence Scientific School not as a formidable foe, but as a friendly ally, in the common cause of industrial education."

A new gauge glass is being introduced for special high pressure by Messrs. Joseph Tomey & Sons, Limited, Birmingham, Eng. Its main feature is its great resisting power to highly superheated steam, and it is not affected by changes of temperature. Recently, on several occasions, a number of these were tested to 350 lb. steam pressure, without bursting or showing signs of strain.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

PYRITE SMELTING.

The Editor:

Sir—I have read with much interest various communications on sulphide smelting, and I wish to give my experiences in confirmation of some of the views already expressed.

In re-heated blast I have found that it always gives a decided advantage over cold-blast practice, even where the rise in temperature is a relatively small one. In one instance 60° made a very noticeable difference both in the speed and control of the furnace. At the plant of the Ouray Smelting Company the blast was heated by the waste gases from the furnace. A number of horizontal convolutions of the blast-pipe were placed in the path of the gases from the down-take and an average temperature of 130° F. was maintained. Just before charging the furnace the temperature would reach 150° to 160°, while shortly afterward the temperature would drop to 100°. The pre-heated blast is of importance in promoting speed in the furnace; but, from my observations, the cold blast gives a higher rate of concentration. Too great speed may obviously cause low concentration, from the fact that it requires a certain length of time to oxidize the sulphides; and, with a heavier blast to promote speed, the result is a hotter top and a low ore-column, and the sulphides will melt and pass to the crucible before they have had time sufficient to be acted on by the blast. Moreover, the regulation and control of the furnace is rendered easier when a heated blast is used. Irregularities of feeding or of charged material do not affect its capacity or its equilibrium so easily as with cold-blast practice, and slag of a higher silica content can be made and handled with greater ease.

The minimum of fuel depends on several factors; among these, cost, quality and speed of furnace come first. At the plant referred to we used 8% of the ore on the first run, speed being a more important requisite than high concentration. For concentration of the matte 2.5 to 3% of coke was used, except for the first 10 or 15 charges, when no fuel at all was used, as the heat from the first run kept things good and hot for some time. By using but 2.5% fuel and a large amount of silicious ore it gave us a relatively slow-driving charge, and also allowed of a concentration of 3 into 1; whereas with 5% coke the concentration would be about 3 into 2, and sometimes even less, the matte merely melting and running through. This first matte averaged 8% copper.

Much also depends on the care used by the crew below as to how the furnace will work on a concentration run. If the jacket-water is discharged at the boiling point, all the time, the furnace will act much better, do better all round work and be far easier to handle.

Blast pressure depends altogether on conditions prevailing at the time. Here, with rather fine charge and an ore-column of 8 ft., we used a pressure of 24 oz. This gives a hot top and causes much flue-dust to be carried over. Of the latter about 4½ tons were made each 24 hours, and its gold and silver contents were highest near the furnace, and lowest at the stack, 100 ft. from the down-take. None of the fume was ever collected, as no means were at hand to do this.

The loss of sulphur from the charge averaged 75%. The furnace at this plant is 36 by 106 in., with a continuous-flow, blast-trapping spout. With a fairly fine charge and blast pressure as given, it would smelt 140 tons of charge per day, and could have handled 20 tons more if adequate settling arrangements had been furnished. Slags could not be settled clean if the forehearth was crowded too fast.

The ordinary blast-trapping spout for continuous slag flow, such as was used here, is, generally speaking, a troublesome device and requires too much care and attention. A plain tap-jacket, of good design and construction, will do better work and give better satisfaction in the long run.

The ore charge as given to the furnace would average 0.8% Cu, and this would give clean slags when the speed of the furnace was kept down to reasonable limits. A slag of high silica content would clean better than one of high iron content, under the same conditions of charge, blast pressure, speed, etc. With 0.5% Cu on the charge, clean slags can be made, unless much zinc be present. With a high-zinc slag to be made, the copper on the charge should be much higher; 3% at least, and 5% is even better. The concentration made here on the first run was 7 or 8 to 1; and, as I have stated, the concentration of the first matte, 3 to 1. Any ores are suitable for pyritic or semi-pyritic work, except those the lead content of which is above 5%. As low as 15% of FeS_2 or its equivalent can be used to good advantage in this process; but it is better to use 25% if the full effect is to be derived from the burning of the iron and sulphur. Where a slag high in iron is made, a moderate amount of zinc has but little, if any, effect on the fluidity of the slag or its driving qualities, unless much alumina is present. Considerable of the zinc is volatilized, practically all of the lead, too, and this phase allows loss of both gold and silver; the loss is greatest in the case of silver, however. The slag made at the Ouray plant averaged as follows: FeO, 25.1; CaO, 15.2; BaO, 3.1; ZnO, 5.0; SiO_2, 45.1; MgO,Al_2O_3 and alkalies to 100%. The average values in the slags were: Au, 0.013 oz.; Ag, 1.6 oz.; Cu always less than 0.1%. These losses, with proper facilities for settling, would be reduced by half.

Dr. Carpenter has spoken of the apparently automatic action of the furnace, under certain conditions. A good example of this selecting process came to my notice here. Our iron sulphide was of poor quality and variable; one noticeably poor lot was put on without my being able to sample it. At 2 A. M. the furnace stopped making matte, and none was made for eight hours, although it had just been giving 800 lb. per hour, and did so again as soon as it regained its normal condition. An analysis of the slag, made during this interruption, gave: FeO, 19.4; MnO, 0.9; CaO, 12.1; ZnO, 5.8; SiO_2, 56.2; Al_2O_3, 1.4. All the iron in the charge was used for the slag, leaving none for the matte. The assay of this slag showed retained values as follows: Au, 0.008 oz.; Ag, 1.8 oz.; Cu, trace.

P. L. MARSTON.

Ouray, Colo., May 24, 1905.

HUNTINGTON MILLS.

The Editor:

Sir—Answering that far-off cry from Bulawayo, Rhodesia, contained in one of your recent numbers, the land of Montezuma endeavors to affiliate itself in professional interest with that classic ground popularly connected with 'King Solomon's mines.' The record, which is here brought forward, is connected with one of the three large mines at El Oro, Mexico, and applies to the crushing direct of auriferous quartz in Huntington mills, of which there are 15 in number, at the Esperanza mine. The particulars were kindly supplied by the engineer of that company, and are therefore authentic. The record of these crushers appeared sufficiently interesting to be worthy of publication.

I will reply *seriatim* to the several queries of your correspondent, Mr. Garthwaite:

1. Type of mill? Huntington mills, of which there are 15. The number of revolutions per minute is 80.

2. Class of ore treated? The ore crushed is that portion passing a grizzly spaced ¾ of an inch, the oversize being treated in the stamp-mills.

3. Hardness? There is a considerable amount of clayey material, possibly amounting to 30%, the balance being a hard white quartz, by no means easy of reduction.

4. Mill used as primary, or re-grinding? Primary crusher.

5. Size of ore crushed? From ¾ in.

6. Kind of screen and size of mesh? Slot screen of 60-mesh. The width of slot is 0.014 in. by ⅜ in. long. Thickness of plate is No. 22 B. & S. gauge wire. There are 5 screens to each mill, 9 by 30 inches.

7. Tons crushed per 24 hours? 22 metric tons.

8. Wearing parts, iron or steel? Midvale rolled steel.

9. Wear of crushing parts? Four pounds per metric ton of ore crushed.

10. Cost of repairs and renewals? 34½ cents gold per 1,000 kilos.

11. Horsepower required? 10 h.p.

12. Amount of fuel? Wood is used, costing about $7 Mexican per cord. Data regarding consumption are not available.

13. Amount of water required daily for mill and boilers? As the mills are worked in connection with 120 stamps, with common water supply, the proportion is not ascertainable.

14. Attendance necessary? For the 15 mills, one white man and five natives are employed per shift. The rate of wages for the former is $8 and the latter from $2 down per shift (Mexican currency).

15. Average cost per ton treated? No reliable figures obtainable.

16. Length of time mill has been in operation? 20 months.

17. Remarks on special features of mill. The mills have been re-designed in many parts, the changes taking the form of strengthening weak parts and adding metal to the grinding surfaces; also in efficient bushing of wearing surfaces. At first the mills were by no means constant in operation; but they have been gradually brought into a state of efficiency for continuous work, and the duty, or crushing capacity, on this class of ore, and through a 60-mesh slot-screen, must be acknowledged by all as very satisfactory work. One minor, but important, alteration ensuring satisfactory running, consisted in casting the muller-head slightly tapering with two annular rings or indentations, both of which features greatly assisted the wooden wedges in holding the muller-shoes in place.

Huntington mills are not usually to be recommended as the most constant form (as regards continuous operation) of the modern crusher; but, with an output of some 22 tons per 24 hours, extending over a considerable period, without an undue cost or loss of time for repairs or renewals, there is not much adverse criticism. The cost of renewals includes new housing, which is usually necessary after a period of about 12 months.

H. G. WEST.

El Oro, Mexico, May 30, 1905.

CONDITIONS IN MEXICO.

The Editor:

Sir—I have read in your issue of May 18 a letter from a gentleman who signs himself 'Director,' with a certain amount of interest and with a great amount of disapproval. It would be far better if the writer, who makes an attack on a country (I trust he did it unwittingly, without knowing the far-reaching consequence as it appears in your JOURNAL) as an individual, would allow his name to be published, as no letter signed anonymously can be supposed to have any weight.

I will refer to his letter *seriatim*, but of necessity in a cursory way.

He complains about government protection and safety from molestation. As a man who has been all over the world and also as one who knows his Mexico well (I suppose that I can almost claim to be the greatest traveler over Mexico in the Republic of Mexico today), I say that he is absolutely and entirely wrong. We are perfectly safe, and if we are so fortunate as to be able to ship either bullion or ore, we can do so without any guard. I would like to know how long this pleasant state of affairs could exist in any of the western portions of the United States of North America without being held up? To quote two instances alone, bullion to the amount of $48,000 (U. S. currency) used to be sent from La Yesca, Territory of Tepic, one of the wildest sections of Mexico, every month without a greater guard than was necessary to pack the mules. Today, from my own district, gold bullion is being sent from Calabacilla and San Jose de Gracia (Sinaloa) to Mazatlan without a greater guard than is necessary to pack the mules, and there are no hold-ups.

He then complains that the reduction of the *pertenencia* tax (from $10 to $6 Mex.) is wrong because it increases blackmailing by denouncement of extension claims. He omits to say that under the new law (which I personally welcome) the supposed blackmailer has to pay—and this is most important—his denouncement fees at the time he makes the denouncement. Under the old law he need not do so, and the fact that he has to do so under the new law is, to my mind, an effectual bar to that class of gentry's operations.

Then, again, living is cheap, but I think that 'Director' had better travel, and he will see what the influx of Americans does in any country. Living used to be very cheap in Hong Kong. Today, compared with the past, it is very dear, due to the holiday-maker of the United States army in Manila.

With regard to the taxation of the foreigner, if 'Director' has any complaint to make, make it to the right quarter, and then it will be immediately rectified.

As to paying fees to officials in order to gain certain privileges, 'Director' should try San Francisco, St. Louis or Washington, and see how rapidly he gains ground. I have the authority (but not the right to use his name) of one of the leading men connected with the Greene Consolidated in Cananea, Sonora, that more business can be done with a high Mexican official in one day than can be done with a man occupying a similar official position in Washington in a year.

As regards labor, I should personally recommend Chicago to 'Director' as his proper home.

In regard to shut-downs, they are entirely due to the trusts and the cyanide company who have for the moment a hold on the mining industry which is diametrically opposed to the welfare of the country. If mine-owners and mine-workers will combine, so as to have their views properly represented to the government, a clean sweep will be made of these vampires. In conclusion, I will say, as an Englishman, that the government of Mexico, as represented by General Porfirio Diaz (more power to him!), is the wisest and best government in the world, and I defy contradiction; I hold no brief nor am I subsidized.

FREDERIC J. M. RHODES.

Chihuahua, Mexico, May 29, 1905.

[We disagree with the general attitude of Mr. Rhodes, but publish his reply to 'Director' as a matter of fairness.—EDITOR.]

Books Reviewed.

Manual of Terreohmetry. By Ethan Scheidler. South Pasadena, Cal.; published by the author. Pages, 44; with diagrams. Price, $2.

This is a brief description of an alleged new method of locating ore by the 'terreohmeter' of Mr. F. H. Brown. The ideal is good, but the publication does not furnish actual results of any considerable value.

Geological Survey of Canada. Dictionary of Altitudes. By James White. Ottawa, Canada; Public Printer. Pages, 143.

This is a helpful and permanently valuable summary which helps to build up the fundamental reference figures of the engineer. The careful classification and arrangement (geographical) largely supplements the lack of the always desirable index. The volume is provided with a relief map of Canada.

United States Geological Survey. Bulletin No. 264. Record for Deep-Well Drilling for 1904. By M. L. Fuller, E. F. Lines and A. C. Veatch. Washington; Government Printing Office. Pages, 108.

This is a brief, condensed epitome of a phase of geological exploitation that is easily lost, and invaluable when preserved in system. The work covered comprises mainly search for oil, gas, water and coal; but incidentally it touches many other valuable non-metallic mineral products.

Das Schachtabteufen im Schwierigen Fallen. By J. Reimer. Freiberg, Germany; Kraz & Gerlach. Pages, 144; with illustrations in text and 19 plates. Price (in New York), $2.75.

This clean-cut quarto on 'Shaft Sinking in Hard Cases' is essentially an extension of earlier publications on the same subject by various German engineers and engineering firms. Most of the papers were of comparatively recent date (1896 to 1902), only one reaching as far back as 1884. The substance of the book is comprised under the titles 'shaft-boring practice' (62 pages), 'the freezing method' (34 pages) and 'shaft-sinking practice proper' (26 pages). The whole tone of the pamphlet bespeaks the breezy,

practical method of clever success. Several tables, giving historical and dimensional detail of the more noted German, Dutch, French and English shafts, are inserted and are of some value. There is no index, which is not so serious an omission as it might be in a book of broader scope; but it would be useful here, for such treatises must be read mostly by busy men. The plates are elaborate and comprise a valuable feature of the work.

Contribution a L'Étude des Relations entre les Effets des Sollicitations Lentes et ceux des Sollicitations Vives dans le Cas des Métaux Ferreux. By Pierre Breuil. Paris, France; Ch. Beranger. Pages, 132; with tables and diagrams.

This pamphlet is a detailed description of tests on steel of various forms treated (rolled, heated, etc.), made slowly, as compared with the same treated quickly. The provisional conclusion seems to be that there is no marked difference in the more valuable properties; reference should be made to the original, which is a valuable contribution to engineering.

Books Received.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

The Copper Mines of Lake Superior. By T. A. Rickard. New York and London; THE ENGINEERING AND MINING JOURNAL. Pages, 164; illustrated. Price, $1.

Newfoundland. Report upon the Mineral Statistics of the Island. 1904. *Report upon Exploration in the Central Carboniferous Basin.* By James P. Howley, Chief of Geological Survey. St. John's, N. F.; Public Printers. Pages, 48.

Statistics of the State of Tasmania for the Year 1903. Compiled in the Office of the Government Statistician. Hobart, Tasmania; Government Printer. Pages, 564.

Experimental Researches on the Constitution of Hydraulic Mortars. By Henri le Chatelier. Translated from the French by Joseph Lathrop Mack. New York; McGraw Publishing Company. Pages, 132; illustrated. Price, $2.

Nevada. The New Gold State. 1905. San Francisco, Cal.; prepared and issued by D. G. Doubleday. Pages, 56; illustrated.

Annual Report of the City Engineer of the City of Providence. Otis F. Clapp, City Engineer, Providence, R. I.; published by the City. Pages, 84; illustrated.

Catalogue Official des Collections du Conservatoire des Arts et Metiers. Fascicule I.—Mecanique. Paris, France; E. Bernard. Pages, 440; illustrated.

Métallurgie Générale. Procedés Métallurgiques et Etude des Métaux. By U. Le Vervier. Paris, France; Gauthier-Villars. Pages, 404; illustrated. Price (in New York), $4.20.

Mineral Production of British Columbia.

The value of the mineral production of British Columbia for the year 1904 was the highest ever reported, with the exception of the year 1901. The quantities and values for the year are given in the following table, taken from an advance proof of the report of the Minister of Mines:

		Quantity.	Value.
Gold, placer	Ounces	55,765	$ 1,115,300
" lode	"	222,042	4,589,608
Silver	"	3,222,481	1,719,516
Copper	Pounds	35,710,128	4,578,037
Lead	"	36,646,244	1,421,874
Coal	Tons	1,253,638	3,760,884
Coke	"	334,102	1,194,140
Other materials			600,000
Total value			$18,977,359

The tons used are long tons, of 2,240 lb. The value of the production by districts and mining divisions is given in the following table:

	Divisions.	Districts.
CARIBOO DISTRICT		$ 474,600
Cariboo Mining Division	$ 313,000	
Quesnel "	150,000	
Omineca "	11,600	
CASSIAR DISTRICT		558,573
KOOTENAY, EAST, DISTRICT		3,210,573
KOOTENAY, WEST, DISTRICT		5,806,070
Ainsworth Division	168,023	
Nelson "	466,683	
Slocan "	1,236 858	
Trail Creek "	3,760,866	
Other parts "	173,640	
LILLOOET DISTRICT		34,583
YALE DISTRICT		4,190,281
Osoyoos, Grand Forks & Greenwood Divisions	4,110,366	
Similkameen "	2,500	
Yale "	77,415	
COAST DISTRICTS (Nanaimo, Alberni, W. Coast V. I., Victoria)		4,702,679
Total		$18,977,359

The report says: "The mineral output of the province for the past year shows, as to the gross value of the product, a distinct gain over the preceding year, and, as a matter of fact, is the greatest ever made by our mines, except that of 1901. This gross value for 1904 is $18,977,359, and represents an increase over 1903 of $1,481,405, or about 8.5%. An analysis of the returns for the whole province shows, however, that this increase has not been general or equal in the various districts, or as to the various minerals produced. The placer gold output shows an increase of $44,880, which is mainly attributable to one district, the Atlin, the other districts only about holding their own; while in those districts where the placer gold is obtained from the river bars, exposed only at lowest water, there is this year a marked falling off in production, since the spring opened up early and the gradual melting of the snow in the mountains prevented any extremes of high or low water, so that the bars were not exposed and, therefore, could not be worked in this manner. The districts showing an increased output, named in the order of precedence, were East Kootenay, the Boundary, the Coast, and the Slocan, while the greatest decrease was in the Rossland camp, this being accounted for by changes in the management of some of the producing companies, and by experiments as to the best methods of treatment of the low-grade ores of the camp being conducted; these temporarily retarded the output.

"The tonnage of ore actually mined in the province has, perhaps, a more direct bearing upon the general business prosperity of the local community than have the values produced, inasmuch as it represents the amount of work actually taking place, and in this respect the year 1904 shows a very greatly increased output of ore, amounting to 1,461,609 tons, an increase over the preceding year of 175,433 tons, or nearly 14%. To say that this increase was made chiefly by the Boundary, East Kootenay and Slocan districts, scarcely does these districts full justice, for not only have they made the increase shown, but they have also offset decreases in certain other districts. In discussing the increase in tonnage of ore mined, it must be remembered that the tonnage mined in 1903, than which that of 1904 is greater by 14%, was itself greater than that of the preceding year (1902) by about 29%, so that, looking back two years, we find the present tonnage output has increased in these two years about 46%. The number of mines shipping in 1904 was 142, as against 125 in 1903, an increase of 17, of which 15 were in the silver-lead district. These, however, shipped less than 100 tons each during the year. Of these 142 mines shipping, there were only 76 that shipped 100 tons or over during the year 1904, as against 74 in 1903, indicating that there has been no material addition to the larger shippers, such increase as has been made in the number of shipping mines being confined to the smaller high-grade properties, and being in reality largely due to the introduction of the 'tribute system' of mining. The total number of men employed during the year in these shipping mines is almost exactly the same as in 1903: 3,306, as compared with 3,303 employees."

In addition to the shipping mines, there were 26 mines reported as employing 159 men, under development, but shipping no ore.

The hydro-electric installation of *La Societa Lombarda* of upper Italy distributes about 25,000 h.p. to a zone of 2,000 sq. kilometers.

The Eschweiler-Woltereck process for the fixation of atmospheric nitrogen consists in passing a current of air mixed with steam over peat which is in slow combustion. Part of the nitrogen unites with nascent hydrogen from the steam, forming ammonia which is later absorbed by sulphuric acid; 20 tons of peat furnish one ton of ammonium sulphate, and (it is reported) at a cost of less than half the present price. Prof. Wilhelm Eschweiler is in the Technical High School of Hanover, and H. C. Woltereck is a Londoner.

The Iodimetric Determination of Copper.

BY T. BROWN, JR.

No particular originality is claimed for the scheme about to be discussed, which consists in the combination of two well-known methods. After a trial of several years, this has proved itself to be valuable because of its wide adaptability, brevity and extreme accuracy. In brief, it consists, first, in the precipitation of the copper (together with the other metals of its attending group) from a sulphuric-acid solution and as a sulphide, by boiling with an excess of sodium thiosulphate; second, in the application of the volumetric iodide-method for the final determination. While the precipitation of copper in this manner is a return to one of the oldest principles, its advantages for rapid work over precipitation by means of hydrogen-sulphide gas or upon aluminum foil are many. The disadvantage of handling the former is apparent. The claim formerly made for aluminum foil is now conceded to be subject to limitation. It is only by expert manipulation that a separation of all the copper can be effected, taking into consideration such issues as the point in boiling when the sulphuric-acid solution has become so concentrated as to re-dissolve the precipitated copper; the solubility of metallic copper in washing with hot water, due to oxidation; and its final recovery from the filtrate with hydrogen-sulphide gas. Should the substance contain such impurities as arsenic, antimony, bismuth, or organic matter in appreciable quantities it is practically an impossibility to effect a complete separation of copper with aluminum foil alone. Ores have been encountered that were boiled for hours without avail.

Having to remove the remaining copper from the filtrates, the means first employed was that of boiling with sodium thiosulphate in preference to saturation with hydrogen sulphide. This procedure finally grew, expanding to a direct precipitation of all the copper by one operation, and in all substances from low-grade ore to impure bullion, and replacing the use of aluminum foil altogether. The present means for the estimation of copper, be it the electrolytic, the iodide or the cyanide method, each has its followers, it being mainly a matter of skill and preference. The main difficulty encountered is, first, to get all the copper. This, it is claimed, can best be effected by the aforementioned means. Then in the combination of this with the volumetric iodide-method, widely acknowledged to be of the highest accuracy, the result is simplicity itself; it makes copper work, which in times past was a matter more or less uncertain, a definite and easy reality.

The method is as follows: If the substance be of very low, low, or medium grade, weigh out 2.5, 1.0 or 0.5 grams, respectively, into a 3-in. porcelain casserole, covering with a watch-glass. If high grade or a matte, however, weigh out 0.5 gram into an 8-oz. Erlemeyer flask, using a stemless funnel in the mouth, to prevent mechanical loss on boiling. Add first a little water, and shake to prevent caking; then 15 c.c. concentrated nitric acid, 3 c.c. concentrated hydrochloric acid; cover and boil down to 5 c.c. in volume. Cool; cautiously add 10 c.c. concentrated sulphuric acid. Place on a hot plate and boil down to distinct white fume. Remove, cool and add about 25 c.c. of water, mixing well; boil five minutes, until all soluble sulphates go into solution. Filter out the residue on a 9-c.m. filter; this residue consists of gangue, with the insoluble sulphates of lead and lime; wash well with warm water. This residue is frequently used for the determination of lead by the ammonium-molybdate titration. To the filtrate, of about 150 c.c. in volume, add from 20 to 30 c.c. of a saturated solution of thiosulphate of soda (or of ordinary pure commercial hypo), boil half an hour, until the sulphides, mixed with free sulphur, settle out, and the supernatant liquid is perfectly clear.

In some low-grade and impure ores a more gentle and longer boiling of an hour or so causes a slightly higher result. In high-grade ore and matte the copper is apparently more quickly precipitated. The solution in boiling should not become concentrated to more than half its volume. If such be the tendency, add water. Sometimes, when the fuming with sulphuric acid has been insufficient, on continuous boiling a minute amount of nitric acid will condense in a drop on the cover-glass, which, falling back into the solution, causes a violent effervescence and a consequent loss. This can readily be avoided by using a little care in the fuming stage. Filter off this precipitate, using an 11-c.m. rapid filter, and wash well with hot water. Remove this, together with the paper, place in a small porcelain crucible and burn in a muffle at a dull-red heat, until the sulphur and the arsenic are burned off and the sulphides are converted into oxides. Should the precipitate be imperfectly washed or contain much silver, it is liable to fuse to the crucible at too high a heat, and will have to be dissolved out with hot nitric acid.

The copper is now present as an oxide free from arsenic, but still may contain antimony, bismuth or silver. Introduce this residue into an 8-oz. pear-shaped flask, and rinse out the crucible first with hot concentrated nitric acid and then with water, adding these to the contents of the flask. Add about half a gram of potassium chlorate, and boil down to half its volume on the plate. Care should be taken not to boil down to a paste, or so low as to decompose the chlorate and liberate free chlorine, easily distinguished by its color and smell. If such be the case, before proceeding further, add a few cubic centimeters of water and boil off the free chlorine. Cool; add about 10 c.c of cold water, then a slight excess of ammonia, and boil again for a few minutes. This procedure insures a more distinct end-reaction in the subsequent titration, particularly with high-grade samples, but in most cases is unnecessary, for if the strong ammonia is cautiously added to the warm solution the boiling point is always reached. Cool; add an excess of acetic acid and cool to the temperature of the room before titrating. To this solution now add an excess of several grams of potassium-iodide crystals, and when dissolved titrate the liberated iodine to a faint-yellow color with a standard solution of sodium thiosulphate. Now add freshly made and clear starch paste as an indicator, and continue the titration until colorless.

As bismuth iodide is yellow (and here might mask the end-reaction, if this be present), the starch paste should be added at an earlier stage of the titration. If but little copper be present, the reaction proceeds slowly, a clear solution sometimes resulting, as the small amount of copper iodide formed is dissolved in the excess of the potassium iodide present. In such a case, more acetic acid should be added, and the flask shaken well, which will restore the blue color if the titration be not finished. In all cases it is well, toward the end, and as an extra precaution, to add a gram or so more of potassium iodide, as the reaction may not have been completed, and more iodine may be liberated. To make the standard solution of sodium thiosulphate, weigh out 39.75 grams of the chemically pure salt, introduce into a bottle and add to this two liters of distilled water. When dissolved, standardize with pure copper wire or foil. One cubic centimeter equals 0.005 gram of copper.

Numerous results obtained by this method have repeatedly been checked by commercial chemists of repute in all sections of the United States. In the East, where the electrolytic method is widely used, differences on mattes of more than one-tenth of one per cent were unusual. In the West, the home of the iodide method, the checks were even closer. It is about five years since the method, just described, was first introduced by the author for smelter work in Mexico, and now it is extensively used by metallurgical chemists throughout the country.

The induction motor is used to transform alternating currents.

The shot iron in cupola slag may be recovered, as by the use of the Sly cinder mill. The shot is melted up in the intermediate heats of a foundry furnace, 3 parts of shot to 7 of iron. The product is cast to such exacting material as exploder boxes of gasoline engines. This is the practice of the Foos Manufacturing Company, of Springfield, Ohio.

The Amalgamated Copper Company.

The Amalgamated Copper Company, for the first time in its history, has made public a statement as to its affairs. This does not include any report of earnings and expenses, the financial information including only the following balance sheet, as of date April 29, 1905:

ASSETS.

Investment in securities, etc	$154,281,303
Office furniture	2,500
Loans to Washoe Copper Co.	7,350,000
Cash and cash assets	2,756,759
Total	$164,390,562

LIABILITIES.

Capital stock outstanding	$153,887,900
Accounts payable	21,970
Dividends payable May 29	1,538,879
Surplus and reserve	8,941,712
Total	$164,390,562

The statement of the company's affairs put out is as follows:

The Amalgamated Copper Company was organized in April, 1899, with a capital stock of $75,000,000. For three months prior thereto copper was selling at between 16c. and 17c. per lb., and there was no accumulation of stocks in the hands of the producers. Scarcely any new discoveries of copper had been made in the United States for several years and the uses of the metal were so rapidly increasing, especially in the electrical field, that the most experienced observers of the market were of the opinion that the price of the metal would not again fall under 14c. per lb. until new and extensive sources of supply were developed, of which there was then no present indication. In this connection the following statement from 'The Mineral Industry' for 1899 is of interest:

"The year 1898 closed with a firm tendency at practically the highest prices of that period, but it was not until early in 1899 that consumption became manifestly larger than production, and stocks already small were drawn upon to such a degree that an upward movement in values took place. Whatever the future may bring forth, it may be stated confidently that consumption is likely to remain satisfactory."

Mr. Marcus Daly was the first president of the company; and it was confidently expected that it would have the benefit of his large experience and of his intimate knowledge of the copper situation in Montana. But, unfortunately, his health became seriously impaired, preventing him from taking any active part in the management of the company, and his death occurred in the second year of the company's existence.

During the last eight months of the year 1899 and throughout 1900 the company was able to sell its product at over 16c. per lb. Dividends at the rate of 1.5% regular and 0.5% extra were paid quarterly from October, 1899, to October, 1901, when the rate was made 1.5% for the quarter. In January, 1902, a dividend of 1% for the previous quarter was paid, and from May, 1902, to January, 1905, quarterly dividends of 0.5% were paid. In January, 1905, the dividend rate was increased to 1%. The average rate of dividends for the total period from October, 1899, to June, 1905, has been 3.875% per annum.

In 1901 the authorized capital stock of the company was increased to $155,000,000, and the new stock was issued for that of the Boston & Montana and the Butte & Boston companies. This has proved to be a very advantageous investment.

In 1901 and 1902, in order to reduce to a minimum the cost of production, a new concentrating and smelting plant was erected at Anaconda, at a cost of over $8,000,000. This is now the most complete and up-to-date copper reduction works in existence, and has been the means of effecting great savings in the cost of production.

At these works are treated the ores of the Anaconda, Washoe, Parrot, Colorado and the Butte & Boston mining companies. The ores of the Boston & Montana Company are treated in its own smelter in Great Falls.

The state of affairs in regard to litigation during the last few years in some of the district courts of Montana has been deplorable. What is known as the law of the apex, passed by Congress in 1872, gives the right, under certain conditions and within certain limits, to follow a vein from its apex into adjoining ground. This law has given rise to a vast amount of litigation, as, under it, the owner of a property adjoining a rich mine, even if he has no valid claim, may assert ownership in the ore of the latter, and subject the real owner to vexatious, costly and prolonged litigation.

The companies controlled wholly or in part by the Amalgamated Company have been harassed by litigation of this nature on an enormous scale and have had to contend constantly with this and other litigation to preserve their existence. The heavy expenses incurred in this litigation and the cost of building the new reduction works, opening and developing new coal mines and making settlements for damage claims, have been paid entirely out of the earnings.

Matters in Montana are now in much better condition. The Supreme Court has passed upon the legality of the company's standing in that State, and the 'Fair Trial bill' prevents the hearing of cases by District Judges against whom prejudice or bias can be shown.

The company owns the entire stock of the Washoe Copper Company, the Colorado Smelting (now the Trenton Mining & Development) Company and the Big Blackfoot Milling Company, and all but a few shares of the Boston & Montana and Butte & Boston companies, and a majority interest in the Anaconda and Parrot companies. The Big Blackfoot Milling Company owns more than 1,000,000 acres of timber lands (upon which there is estimated to be over 4,000,000,000 feet of standing timber) and saw-mills turning out 5,000,000 feet of lumber per annum.

The company also owns all the stock of the Diamondville Coal & Coke Company, which mines and ships 600,000 tons of coal per annum, and its mines in Wyoming are estimated by coal experts to contain an available supply of 73,500,000 tons.

The company, through its ownership of all the Washoe Copper Company stock, holds 1,900 acres of the Bear Creek coal lands in the vicinity of Red Lodge, Mont., and also all the coking coal property at Storrs, Mont., now under development, as well as a controlling interest in the Cokedale Coal Company, owning coal lands and a plant which is equipped with 100 coking ovens.

The company likewise owns a public sampling works, a business block in Butte and another business block in Anaconda.

From the Anaconda Company's coal lands at Belt, Mont., are mined and shipped 375,000 tons of coal per annum, and coal experts estimate that there still remain 3,100,000 tons of available supply. The Anaconda Company also owns a hotel in Anaconda and one in Hamilton, and has a very large interest in the stock of the Butte, Anaconda & Pacific Railroad Company, the line of which runs from Butte to Anaconda. It also owns 27,000 acres of timber lands. Its saw-mills in Hamilton, Mont., turn out 30,000,000 ft. of lumber annually.

The principal asset of the company consists in the ownership, through the companies above mentioned, of copper mines, the value of which is largely dependent upon the duration of their productiveness. The mines look as well at the present time as at any period of the company's existence, and there are no indications that they have not a long productive life before them.

Exclusive, however, of the said copper mines, the assets of the company (consisting of timber lands, coal mines, reduction works, saw-mills, railways, real estate, buildings, copper and cash) controlled through the ownership of other companies are of very great value, exceeding, in the opinion of experts in whom the officers have entire confidence, $50,000,000 over all liabilities of the company.

The company, directly or indirectly, employs in Montana 12,000 men and expends annually in wages $14,000,000.

The companies, owned wholly or in part by the Amalgamated Company, produced in 1904 252,000,000 lb. of refined copper (including only a small amount from custom ore). Of this amount the Amalgamated Company received the benefit from 202,000,000 lb., which is about 25% of the total production of the United States. As the outstanding capital stock of the company is $153,887,900, each pound of copper produced is capitalized at 76c. per pound, without taking into consideration any earnings from other sources than mining.

By comparison with the oldest and most conservative copper companies, it will be found that the Calumet & Hecla Company's stock, selling at a market valuation of about $64,000,000, and producing annually 80,000,000 lb. of copper, has a market capitalization of 80c. per pound of copper produced; and that the Rio Tinto Company, having a market valuation of about $125,000,000 (including stock and bonds) and producing annually refined copper and copper in pyrites amounting to 80,000,000 lb., has a market capitalization of $1.56 per pound produced.

A fluctuation in the price received for the product for one year, between 11.71 and 16.50c. per pound (the highest and lowest prices during the last five years), means a difference to a copper company of the magnitude of the Amalgamated Company of $9,700,000 in annual net earnings, or over 6% on the capital stock.

At the present time the status of the company and the position of the metal market are more satisfactory than at any time since the early part of 1901.

International Petroleum Congress.

Repeated references have been made in this JOURNAL, both to the exposition soon to be opened at Liège, Belgium, and also to the petroleum congress which is to be held in connection therewith. The committee in charge of this latter are stimulating an intelligent interest in the meeting by the timely publication of such papers on the geology, chemistry, purification and uses of petroleum and its allied products as may form a basis for the understanding and appreciation of this opportunity. In accordance with this, from a permanent committee which was organized in connection with the first international petroleum congress of 1900 at Paris (this at Liège being the second), there appears this collection of papers. The content includes many articles of lesser worth, and some of really permanent and classical value. We note the names of Redwood, Engler, Markownikoff, Roux and others. As usual with most French treatises worthy of perusal, that indispensable help for the overworked reader, an index, is utterly ignored. It is evidence of half-interest and half-fidelity when such neglect is so painfully evident. In this connection, it may be mentioned that the exposition and petroleum congress advertised in certain papers for Lüttich (evidently copied from German sources) refers to the German form of the name Liège.

The Moore 'vacuum-tube,' a recent invention, is a long glass tube containing a small quantity of a gas which is luciferous when excited by an alternating electric current. The light is soft and white. The tubes are hung at the sides or from the ceiling of the stores, offices or other rooms to be lighted.

Tube-Mill Results.*

BY H. LEUPOLD.

The tube-mill at the Treasury mine is so far the only one in South Africa working continuously at fine-grinding the whole of the concentrate from a full battery, all cyanide treatment of concentrate as such being avoided. The Treasury battery consists of sixty 1,140-lb. stamps, and the stamp-duty, through a 26-mesh screen, was 4.75 tons before the tube-mill started. Of the pulp, 7% of the concentrate averaged 12.7 dwt., the residue 2.13 dwt.; 59% of the sand averaged 4.2 dwt., the residue 1.19 dwt.; 34% of the slime averaged 2.9 dwt., the residue 0.76 dwt. The existing tank-capacity is: for concentrate, 7 tanks, 14,000 cu. ft.; for sand, 10 tanks, 50,000 cu. ft.; for slime, 9 tanks, 38,000 cu.ft., which low figures sufficiently account for the rich residues. The tube-mill in use is 3 ft. 6 in. by 13 ft. (inside measure), of Krupp pattern, the shell liners being of special cast iron one inch thick, each one bolted to the shell by two ⅞-in. bolts with countersunk heads; these hold the plates in position until they are worn to ⅛ in. thick. The power required to drive the tube—by belt from main line-shaft—could not be determined with precision, as too many varying loads, both at surface and underground, depend on this same shaft; from what diagrams could be taken under favorable conditions, it has been computed at 20 horsepower.

The first run lasted from October 12 to November 22, when the tube-mill was stopped, a few of the liner plates being worn in places to ½ in., though the majority still had a minimum thickness of ⅞ in. These latter I have since found capable of giving another 12 days' work. The results of the first run were: Actual running time of the tube-mill, 955 hr. 45 min.; weight of liners consumed, 3,115 lb.; weight of concentrate passed, 1,050 tons; weight of rock milled by battery, 10,750 tons; weight of pebbles consumed, 4,191 lb.; mercury used (deficit), 85 oz.; amalgam won, 575 oz.; fine gold won, 168 oz. The total working costs were $934.56, or 89c. per ton ground, or 8.7c. per ton milled. During the first run the usual 36-mesh screen remained in use most of the time, the grade and size of launders permitting only a tentative and partial application of 22- and 20-mesh. No appreciable increase in stamp-duty was therefore attained, and the only advantage secured lay in the elimination of the rich concentrate-residue (2.13 dwt. average), and in the lower value of the sand and slime-residue, which fell from 1.19 and 0.76 dwt., respectively, in September to 1.10 and 0.61, respectively, in October and November. This resulted altogether in a saving of 80 oz. fine gold on the 1,050 tons concentrate re-ground, and the 10,250 tons sand and slime treated during the run. The rattling and pattering of the loose pebbles against the liners should be heard most distinctly. At too low or too high a speed the pebbles form with the heavy pulp a compact mass, producing a swishing sound, when the liners will be found to wear rapidly and the pebbles become flat discs, which are quite unsuited to do their proper work in the tube.

The second run, with new liners, lasted from January 1 to February 20, a few worn-out liners being replaced by others, of the first run, on February 9. On February 20 the whole of the liners were removed and a clean-up made. The working costs were reduced to 72c. per ton of concentrate, equal to 6.58c. per ton milled. During this run the mortar-screens were gradually changed to 17-mesh, the latter being in use exclusively since January 15. This resulted in an increase of stamp-duty from 4.8 to 5.2 tons, or 8%. The provision of rock for the battery was deficient until the beginning of February, which caused irregular feeding, and I expect that with full mill-bins in the future the duty will be 5.5 tons per stamp. The gain amounts to 194 oz. 11 dwt., or 0.287 dwt. per ton milled—value, say, 30 cents. The figures here laid before you are insufficient to warrant any far-reaching deductions; yet, on the whole, they may be considered promising for the tube-mill.

*Abstracted from a paper entitled 'Treasury Tube Mill Results,' *Proceedings* of the South African Association of Engineers, April, 1905.

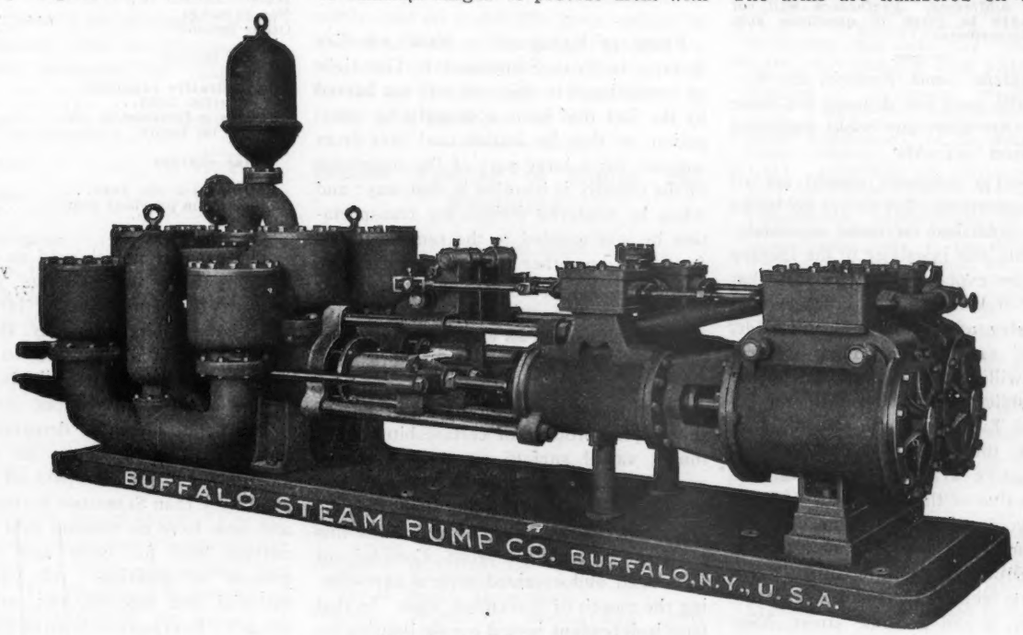
Electric Welding.

The welding of metals by electricity (the Thomson process, so called) is an industry that finds a wide application. The current supplied is 'stepped down' to four volts or less, and transferred from the alternating to the continuous form. The uses include: The manufacture of wire fencing, the nodes being fused together, instead of woven as formerly, thus incidentally saving material; the setting of heads in bolts; the making of printers' chases in exact regularity; the welding of endless wire-rings, and of gun parts; the joining of coils of pipe for refrigerating plants; the union of drop-forgings in brake- and draw-rods for cars; the making of channel-section rims for automobiles and bicycles, and steel tires for wagons; the joining of armoring wires of submarine and buoy cables; of frames and dash-guards, and other such work for carriages; cask-hoops, and even the high-pressure steel vessels for bottling works and gas cylinders. The strain factor of hand-welding to that of the solid part is 89%, while in electrical welding it is 92%. The subject is well reviewed by R. J. Wallis-Jones in an engineering supplement of *The Times*.

Coal has been found about 55 miles northwest of Portland, Oregon; it occurs in a bed 6 or 7 ft. thick, and seems to run high in water, ash and sulphur, though it burns well. It slacks readily as though it were a lignite.

Compound Duplex Mine Pump.

The conditions under which a mine pump operates are about as severe as any found in pumping practice, and tax the resources of the designer to the utmost in order to produce a satisfactory unit where efficiency, durability and weight are all conflicting factors. The mine pump is not only expected to handle water which may contain quantities of mud, sand, etc., in suspension or chemically capable of attacking anything but a glass bottle, but it must do so under wide fluctuations in head and suction depth and yet afford a fair degree of economy. When it is considered that such pumps must be above all things reliable, and are handicapped by poor care and attention, their salient points cannot fail to be of interest to the engineer. As will be seen from the following description of a standard type of these pumps, the leading idea of the designer has been to facilitate the working qualities at the expense of space, weight and machine-shop costs. At points where adjustment, repairs and replacements are inevitable, care has been taken to afford every convenience for their rapid and easy execution.



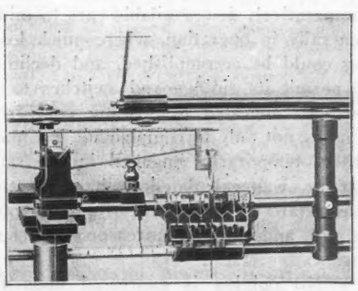
BUFFALO DUPLEX MINE PUMP.

The pump shown in the cut is one built by the Buffalo Steam Pump Company, with four single-acting, outside-packed water plungers which work in the ends of the water cylinders, the latter having a partition in the middle. Each pair of plungers is connected together by heavy steel side-rods which are carried through cast-steel crossheads, each of which is in turn connected to the piston rod of the tandem steam cylinders. An undesirable feature of most mine pumps lies in the inaccessibility of the water valves. Here both sets of valves are placed in large chambers so arranged as to be easily reached, and at the same time they are above the level of the cylinders, so that they will be always full of water or primed. The uninterrupted area of each set of valves is equal to 50% of the plunger, by which a noiseless and efficient action is obtained. The steam cylinders are connected by a well-designed cradle of sufficient length to provide them with deep stuffing-boxes and give ample room for re-packing. The valve stems are provided with means for adjustment and taking up wear, and allow the valves to be set without uncovering steam chest.

Any part of the pump can be removed without disturbing the neighboring parts or dismantling the machine. They are built to stand a working pressure of 500 lb. to the square inch, and all attachments are especially strong, in order to meet the rough usage and lack of attention to which they are often subjected. The proper and generous distribution of metal in this pump contributes greatly to its smooth action and lack of vibration. Originally designed for mine work, its rugged characteristics have caused its adoption for situations of less severe service, but where its ability to stand up to its work without skilled attendance was a desirable item.

An Improved Multiple-Rider Carrier

The accompanying illustration shows an improved multiple-rider carrier for button balances, just placed on the market by Wm. Ainsworth & Sons, of Denver, Colo. The weights, or riders, are each carried by an individual arm and cannot become displaced except through gross carelessness. The arms are numbered on their front surfaces to correspond with the weight of the rider carried, and pivoted at the rear so as to just swing clear of the comb-shaped bar below the stirrup, and are operated by a single rod with a thumb-piece on the end of it extending through the case. When the arms are up, the riders are carried by them far enough above the comb-shaped bar so as not to interfere with the oscillations of the beam.



MULTIPLE-RIDER CARRIER.

In operating, it is only necessary to move the rod to the right or left until the figure corresponding to the weight of the rider to be shifted stands opposite to the index pointer shown to the left of the frame carrying the arms; then give the rod a slight turn and the arm carrying the rider is swung downward, shifting it on to the comb-shaped bar. When the weighing is completed, a glance at the figures on the arms that are down shows the combined weight of the riders on the bar. A slight turn of the rod resets all of the riders simultaneously. The carrier can be operated with great speed and certainty, and the riders can be used for an indefinite length of time without perceptible change in weight.

By the brass industry at Waterbury, Conn., alone, 70,000 people are supported.

Harveyized steel has largely given way to the so-called Krupp-cemented ('K. C.') steel for armor.

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others beside the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be pubished, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Kaolin, Ocher and Fullers' Earth.—What are the uses and demand for these minerals? Are there any books published on the subject?—Y. M.

Answer.—The minerals named are of economic importance, but as yet no books have been published on them separately. To an extent, this inactivity in the literary field may be explained by the fact that consumers of kaolin in the crockery and paper industry, of ocher in the paint trade, and fullers' earth for purifying mineral oil, are unwilling to enlighten the public. In such publications as 'The Mineral Industry' and THE ENGINEERING AND MINING JOURNAL there have appeared at intervals instructive articles bearing on the industrial value of these minerals. If you can, send good specimens of the minerals to dealers for their opinion; among whom we may mention Hammill & Gillespie, 240 Front street, New York, and Fuerst Bros. & Company, 2 and 4 Stone street, New York.

Recent Legal Decisions.

SPECIALLY REPORTED.

DUTY ON DRILLED DIAMOND BORTS.—Drilled diamond bort is free of duty under a decision just made by Judge Townsend, of the United States Circuit Court, at New York, confirming a ruling by the Board of General Appraisers. The American Express Company, in behalf of Gustavus C. Henning, imported a quantity of drilled bort, on which Collector Stranahan, of the port of New York, assessed duty at 10% *ad valorem*, as precious stones advanced in condition, under Par. 435, Act of 1897. The importer appealed, claiming that the merchandise was free of duty under Par. 545, relating to diamond dust or bort, and this appeal being sustained by the Board, the Collector carried the case to the Circuit Court.

The record of the testimony taken before the Board was presented to Judge Townsend. Mr. Henning, when on the stand, testified that the drilled bort was used in the manufacture of wire dies, and diamond tools. Other witnesses testified that the holes drilled in the bort were rough, and before the stones could be used as a finished product, the holes were enlarged, and made smooth. It was also explained by the importer that the rough drilling of the stones could not be done in this country. The Board declared, in its opinion, that it was the intention of Congress to allow the free importation of a class of merchandise not made here, and which is largely used in important industries, such as wire making. Accordingly the Board sustained the protest, allowing the free entry of the drilled bort.

After hearing the arguments of counsel on both sides, Judge Townsend expressed his agreement with the opinion and decision of the Board.

RIGHT OF RAILROADS TO REGULATE CAR SUPPLY TO COAL SHIPPERS.—1. The right of complainant to ship coal was not barred by the fact that he is a druggist by occupation, or that he loaded coal cars from wagons, for a large part of the commerce of the country is handled in that way; and when he tendered freight for transportation he was entitled to the same facilities furnished to other shippers under like conditions.

2. During the anthracite coal strike of 1902, which caused an extremely large demand for bituminous coal and great increase in the price of that coal, complainant arranged for the purchase and sale of the surplus product of certain bituminous mines, called surface or country mines, and for hauling the coal by wagon to stations or sidings and loading upon defendant's cars. Under normal conditions this could not be done at a profit. Complainant demanded and received several cars during the month of November, 1902. In that month defendant issued a rule limiting its coal cars to mines having track connection with its road, and this rule was kept in force during the strike period. The demand for coal throughout the strike resulted in the greatest tax upon the railroad equipment and in the congestion of lines, yards and terminals. The mines loading by tipple and by track connection received far less than their usual car supply. Under these and other conditions, defendant's temporary rule, confining its comparatively few available cars to mines generally in operation, where quick loading could be accomplished, and declining to permit its sidings and switches to be further congested by loading coal from wagons, not only by complainant, but many others temporarily engaged in the same pursuit, was calculated to hasten rather than retard the movement of coal for public use, and was not unreasonable or unjust.

3. No opinion is expressed upon the point whether a railroad may, under ordinary conditions, discriminate in furnishing cars as between the methods of loading by tipple and wagon, or whether without a rule it may, even in great emergency, discriminate between the two classes of shipments, and the decision is confined to the particular situation disclosed by the record in this proceeding.—Complaint of Charles A. Thompson against the Pennsylvania Railroad Company; Interstate Commerce Commission.

Chemistry is the study of compounds.

Abstracts of Official Reports.

International Nickel Company.

This company controls a large share of the nickel business of the world. It owns the stocks of a number of subsidiary companies. The report for the year ending March 31, 1905, gives a financial statement, which may be summed up as follows:

Net earnings	$1,430,382
Other income	3,723
Total income	$1,434,105
Administrative expenses	$118,081
Depreciation fund	144,667
Reserves, adjustments, etc.	443,715
Interest on bonds	503,263
Total charges	$1,209,726
Surplus for the year	$224,379
Balance from previous year	763,251
Total surplus	$987,630

The net earnings showed an increase of $356,794 over the previous year. The treasurer's report says: "Hereafter all financial exhibits will only show profits as made by actual deliveries to customers. All material in process will be computed at the actual cost without intercompany profits. The increased demand for nickel has enabled us to reduce our stocks considerably, and we have paid off during the year more than $1,000,000 borrowed money and now have no floating debt other than current bills for labor and supplies in process of auditing. All purchases of material and supplies, etc., are paid for in cash. Every possible advantage is taken of discounts for such settlements. The major part of the company's cash on hand is in trust companies drawing the full rate of interest."

The president's report says: "During the last fiscal year the new plant of the Canadian Copper Company at Copper Cliff has been completed, and the results of a limited operation of the new works have indicated that the company will realize the expected saving in cost of production and have demonstrated the wisdom of the policy of dismantling the old plants and erecting a new one. The increased business of the company has also made it necessary that facilities for the mining and smelting operations of the company in Canada be increased, and expenditures have been authorized which will increase the output of the Canadian matte about 50%. The company is also conducting a series of experiments at the refining works, and there is fair prospect that in this department a further saving can be made.

"We are still endeavoring to introduce nickel into new commercial arts and have been fairly successful. One of the principal items in this report has been the adoption of nickel-steel eye bars in the construction of the Blackwell's Island bridge now being built by New York city. It is our hope that the superiority of nickel steel will gradually win favor in many directions with those who believe that a measurable first cost is insignificant as compared with the true economy of in-

creased strength, lightness of construction and wearing qualities."

Cambria Steel Company.

This company owns steel works at Johnstown, Pa.; also coal mines, iron ore mines and other property auxiliary to the main enterprise. The capital stock is $45,000,000. The report for the year 1904 shows a decrease in net earnings of $1,267,983, as compared with the previous year. The financial statement for 1904 is as follows:

Net earnings	$1,925,543
Interest on investments	289,353
Total income	$2,214,896
Fixed charges	$451,239
Depreciation	350,000
Total deductions	$801,239
Net balance	$1,413,657

From this balance dividends amounting to $1,350,000 were paid, leaving a surplus of $63,657. Adding the balance brought forward from previous year, left a total surplus of $2,223,911 carried forward to current year. The depreciation fund amounted to $1,550,000, and the improvement fund to $2,000,000 at the close of the year.

The president's report says: "The authorized capital stock named in the charter is $50,000,000, of which $45,000,000 has been issued. The remaining $5,000,000 can only be issued hereafter for money or property. Of the $3,500,000 term notes issued in December, 1900, $2,890,000 has been paid, leaving $610,000 outstanding, $45,000 of which are due in 1905 and $565,000 in 1906.

"The physical condition of the plant has been fully maintained by current repairs and additions. Shipments of steel show a decrease compared with the preceding year of 25.2% in quantity and in gross value of all products shipped of 36.7%. The depression in the steel business that commenced in the summer of 1903 continued in a more severe form up to October, 1904; it was most pronounced in curtailment of orders on the part of railway and shipyards, little new building being done, and repairs either being neglected or maintained at the minimum. Commencing with October, 1904, the company's business was of satisfactory volume excepting in plates and rails."

Of the various soda processes, the Solvay is used at Rochester, N. Y.; the Castner-Killner, the Acker, and the Roberts (electrolytic) at Niagara Falls.

Tin crystals, from hydrochloric acid, tin tetrachloride (stannic), and a wood-pulp bleach are some of the new products considered in connection with the electrolytic alkali and bleach industry.

The availability of water, as an ionizing solvent for all appropriate electrolytic work, is seriously diminished by its activity on some of the cathode products. In view of this, experimenters are examining other solvents, and a recent patent (by W. Hooper) suggests the use of liquid anhydrous ammonia for the electrolyte in the production of magnesium from magnesic chloride.

The thermite-weld process has been recently used on a one-mile track section in Holyoke, Mass. The gang consisted of one boss and three laborers. The cost was figured at $6 per joint. From 8 to 15 joints were made per day.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending May 30, 1905.

790,904. PROCESS OF MAKING BRICK OR ARTIFICIAL STONE.—Louis F. Kwiatkowski, New York, N. Y.

790,906. TUBULAR FLEXIBLE ARTICLES.—Arthur H. Marks, Akron, Ohio.

790,907. METHOD OF CONSTRUCTING TUBULAR FLEXIBLE ARTICLES.—Arthur H. Marks, Akron, Ohio.

790,913. MINERAL RECLAIMER AND SAVER.—Homer L. Orr and Fred B. Finley, Fort Collins, Colo.

790,918. APPARATUS FOR THE MANUFACTURE OF STRIPS OF EXPLOSIVE POWDER.—Francis I. du Pont, Wilmington, Del.

790,922. APPARATUS FOR OBTAINING OXIDES OF ALKALINE METALS.—Charles W. Roepper, Philadelphia, Pa., and Willis E. Harmon, Mechanic Falls, Me., assignors to American Electrolytic Company.

790,927. TUBE-MILL.—George H. Sharp, Jonesville, Mich., assignor of one-third to Louis C. Bonnot, Canton, Ohio.

790,932. ASPHALTIC COMPOSITION.—John B. Swindle, Ardmore, Ind. Ter.

790,950. MANUFACTURE OF TIN OR TERNE PLATES.—William G. Brangham and John H. Rogers, Niles, Ohio, assignors to American Tin Plate Company, Pittsburg, Pa.

791,001. BIT OR CUTTER FOR COAL OR ROCK MINING DRILLS.—George H. Bittenbender, Plymouth, Pa.

791,007. BRICK-PRESS.—Edgar D. Church, Saginaw, Mich., assignor to American Sandstone Brick Machinery Company, Saginaw, Mich.

791,066. COAL-BURNING FURNACE.—John B. Archer, Kensington, Md.

791,067. PROCESS OF BURNING FUEL.—John B. Archer, Kensington, Md.

791,074. HYDRAULIC PLATE CLOSING AND RIVETING MACHINE.—Henry A. Carpenter, Sewickley, Pa., assignor to Riter-Conley Manufacturing Company, Jersey City, N. J.

791,090. PROCESS OF EXTRACTING NICKEL FROM NICKEL-BEARING SUBSTANCES.—Hans A. Frasch, New York, N. Y.

791,100. WATERPROOF EXPLOSIVE CAP FOR BLASTING PURPOSES.—Edward W. Keith, Denver, and Albert H. Boyd, Leadville, Colo.

791,151. STEAM-SHOVEL.—George W. King, Harry J. Barnhart, and Charles B. King, Marion, Ohio, assignors to the Marion Steam Shovel Company, Marion, Ohio.

791,157. STONE-SAW.—Archibald H. MacNutt, San Francisco, Cal.

791,160. APPARATUS FOR WASHING GAS.—John S. Oursler, Newcastle, Pa., assignor of one-half to John Reis, Newcastle, Pa.

791,170. MANUFACTURE OF STEEL.—James Vernon, Newton Stewart, Scotland.

791,174. CONVEYER FOR UNLOADING VESSELS.—Clarence K. Baldwin, New York, N. Y., assignor to the Robins Conveying Belt Company.

791,175. CONVEYER.—Clarence K. Baldwin and Lincoln Moss, New York, N. Y., assignors to Robins Conveying Belt Company, New York, N. Y.

791,189. MANUFACTURE OF MANGANESE-STEEL RAILS OR SHAPES.—Robert A. Hadfield, Sheffield, England.

791,193. MACHINE FOR STRAIGHTENING TUBES, SHAFTS, BARS, OR THE LIKE.—Otto Heer, Dusseldorf, Germany.

791,200. CONCENTRATOR.—Charles O. Michaelsen, Salt Lake City, Utah.

791,216. APPARATUS FOR AND PROCESS OF MANUFACTURING WIRE-GLASS.—Edmund C. Schmertz, Pittsburg, Pa.; Ralph Longenecker, administrator of said Edmund C. Schmertz, deceased, assignor, by mesne assignments, to the Schmertz Wire Glass Company, Pittsburg, Pa.

791,217. PROCESS OF AND APPARATUS FOR MANUFACTURING WIRE-GLASS.—Edmund C. Schmertz, Pittsburg, Pa.; Ralph Longenecker, administrator of said Edmund C. Schmertz, deceased, assignor, by mesne assignments, to the Schmertz Wire Glass Company, Pittsburg, Pa.

791,231. MINER'S LAMP-HOLDER AND HEAD-PROTECTOR.—Isaac Wantling and Sylvester Doubet, Peoria, Ill.

791,262. BRICK-MACHINE.—Walter P. Grath, St. Louis, Mo.

791,264. BIT FOR ROCK-DRILLS.—Martin Hardsocg, Ottumwa, Iowa.

791,276. MINER'S LAMP.—Eugene F. Long, Scranton, Pa.

791,305. ART OF SEPARATING GOLD OR OTHER DIAMAGNETIC METALS.—Louis T. Weiss, New York, N. Y.

791,306. PROCESS OF MAKING HYDROHALOGENIC ACID.—Felix W. Westhausser, Hohenheim, near Stuttgart, Germany.

791,328. DISINTEGRATING-ROLLER.—Fayette E. Davenport, Fayetteville, N. Y.

791,341. ELECTROLYTIC DEPOSITION OF METALS.—Herbert C. Harrison, London, and Joseph Day, Weston-super-Mare, England, assignors to said Herbert C. Harrison.

791,352. CHUTE.—Hermann Marcus, Cologne, Germany.

791,387. JET-NOZZLE FOR WET CONCENTRATORS.—John L. Weaver, Boise, Idaho.

791,401. PROCESS OF EXTRACTING ZINC FROM ITS ORES—Anson G. Betts, Troy, N. Y.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week Ending May 20, 1905.

8,817 of 1904. TREATING SULPHIDE ORES.—M. Malzac, Paris, France. Apparatus for conducting a process for treating sulphide ores of metals whose hydroxides are soluble in an excess of ammonia solution.

9,071 of 1904. MAKING BRIQUETTES.—T. Rouse and H. Cohn, London. Agglomerating coal dust into briquettes by a mixture of petroleum emulsion and silicate of soda in water.

12,785 of 1904. GAS SMELTING OF IRON ORES.—E. Fleischer, Dresden, Germany. Smelting iron ores in inclined revolving tubular furnaces by means of water gas.

13,875 of 1904. ALKALI ALUMINA.—G. Levi, Rome, Italy. Obtaining alkali and alumina from alkaline silicates of alumina, by digesting under considerable pressure with an alkaline solution, so producing silicate of alkali, and alumina.

15,294 of 1904. ANTIMONY REFINING.—A. G. Betts, Troy, New York, U. S. A. Refining antimony by electrolyzing antimony trifluoride, in a cell having the impure antimony as anode.

15,298 of 1904. RECOVERING METALS FROM SLIME.—A. G. Betts, Troy, New York, U. S. A. A process for recovering the metals, such as gold, silver, lead, copper, etc., obtained in anode slime, by using a solvent such as ferric sulphate in a cycle of operations.

16,412 of 1904. CASE-HARDENING STEEL.—Cyanide Gesellschaft, Berlin, Germany. Case-hardening iron and steel by packing with organic refuse containing a large proportion of nitrogen and heating to a high temperature.

17,031 of 1904. ALUMINA SOLDER.—F. Jackman, Bradford. A solder for aluminum containing 64 parts of tin, 30 parts of zinc, lead one part and aluminum one part.

Special Correspondence.

San Francisco. May 31.

The fields in which gold dredging may be carried on in California are being materially extended. In Sacramento county, for example, operations have thus far been confined to the vicinity of Fairoaks and Folsom, but of late considerable of the American river bottom land between Brighton and Folsom has been bonded for dredging purposes. The Shields and Taylor ranches, embracing a considerable area, have been bonded to the interests represented by R. G. Hanford, and it is said the Pike and Kendall ranch has been bonded to E. H. Picket, of Placerville, for Eastern men. The Ashburton Mining Co., near Fairoaks, is trying to bond additional neighboring land for dredging purposes. Drills are testing lands down as far as Routier, some distance below the present active dredging operations. These lands are all held under bond by representatives of dredging interests. Drills are also at work on land on the Rocklin road, several miles from Folsom, where there are many acres of idle land.

In this connection it may be stated that there is now some further agitation of the question of damage done to the rivers by the dredges at Oroville. There are now 30 boats working in the Oroville field, all but six of which are located away from the river. These six put nothing in the river not there before, but certainly stir up the sands. Even the landlocked boats come in for some small share of complaint. The opinion prevails among the landowners that the boats which are landlocked and working in pits cannot possibly do any damage, but the practice of leading a large stream from the river, using it as a dump for the sand and débris of a dredge-boat and allowing it to flow unrestricted back into the river, causes some uneasiness. The cuts flow back into the river direct, and there is no attempt to impound the water or to form a settling basin of dead water at the lower end. The water in these cuts does not appear much muddier than that of the main stream above them, though the water at Oroville is considerably clearer than below the dredge fields. There is no doubt that much of the sand deposited at the end of the sluice-boxes is covered up by the heavy rocks and gravel which falls upon it from the big stackers in the rear of the boats. It is held by many, including some who are not interested in the dredge business in any way, that the great bulk of the sand is thus covered up and prevented from being carried down stream by any stage of the river, however high. If the owners of boats in the river would close the lower ends of the channel in which they are working, all source of complaint against them might be stopped.

The ground in the *tule* basin of Sutter county is now being prospected for dredging purposes, and many thousand acres have been bonded. It is predicted by some enthusiasts that that section will in time become the most productive of the dredging fields, as the absence of rock and gravel will permit the deposits to be worked very cheaply indeed.

Up in Grass Valley, Nevada county, the most productive gold country in the State, it has not been usual to work over old dumps, as in some other places. Just now, however, the Grass Valley *Union* says that at the Idaho-Maryland mine, 20 stamps are dropping continuously on what was thrown aside as waste rock some years ago under former management. The interesting part of it all is that by the time the mammoth dump has been fed the stamps, the new company will have cleaned up sufficient to have paid a considerable part of the running expenses of re-opening the mine. Thousands of tons of ore were carried to the dump when the mine was pouring forth millions, and so rich was the ore that the same close attention was not paid to it as at present. In the old Idaho it had to be rich to pay, owing to the number of times it was handled before finally reaching the surface. Had there been a vertical shaft the expense would have been much less. Then, too, methods of today were not in vogue. Consequently, great quantities of rock went on to the dump which can now be milled at a profit. True, it is not large, but it helps, and where there is so large a dump the gain in the end will be considerable. The mill might as well run as to wait until the mine is opened.

Denver. June 1.

Now that practically all the suits against the Stratton estate are settled, the executors are in a position to discuss the plans to carry out the provisions of the testator's will, and arrangements to that effect will be made at once.

At a meeting of the directors of the Stratton's Cripple Creek Mining & Development Co., held at Colorado Springs on May 25, Block 211 of the John A. Logan property, to a depth of 500 ft., was leased to the Logan Mining & Leasing Co., composed of some prominent Colorado Springs people.

It is generally understood that the Denver & Rio Grande Railroad Co. has decided to build two more branches, one from Durango to Green river, Utah, and one from Creede to Durango, which will form a connection between the southern and northern systems of the Gould lines.

It will probably be October 1 before active operations at the new mint will commence, as, owing to some faulty construction of the floor, which is to support the heavy coinage machines, considerable alterations will have to be made.

By a reorganization plan just adopted, the famous Doctor-Jackpot company's stockholders have saved their valuable property, which was about to be sold for a bonded debt of $50,000. The sum of $75,000 was raised by assessing stockholders 2½c. per share, which paid this debt and $15,000 indebtedness besides, leaving $10,000 in the treasury. These two properties have been among the largest producers in the Cripple Creek district and have been extensively developed. At the present time about a dozen sets of lessees are at work.

In an exploring shaft on the Camp Bird mine which was started a few months ago, a rich ore-shoot was struck a few days ago. It is said to be about five feet wide and to contain very high values.

At the Salida independent smelter, about 600 tons of ore are treated daily, the ore supply coming principally from the Leadville district. The new Monarch company, which supplies about 125 tons of this amount, is preparing to erect a 200-ton concentrating plant at the mine, construction of which will commence before long.

Persistent rumors are current that the United States Reduction & Refining Co. has sold its large plants at Colorado City to the American Smelting & Refining Company.

Scranton. June 5.

The independent coal operators are dropping out, and their properties are being assimilated into the great railway corporations. The retirement of William Connell, of Scranton, from the control of the coal property in the Lackawanna valley brings to an end the career of one of the most remarkable men who have climbed in our generation from the lowest to the topmost round of the ladder of success. When the announcement was made on June 1 that Mr. Connell had sold out the last of his coal property to the Delaware, Lackawanna & Western Railway Co., there was general regret felt not merely from his associates, but by the coal workers, from whose ranks he rose as much by his enlightened dealing with those under him as by the mere accumulation of personal wealth.

The coal properties that have been purchased by the Delaware, Lackawanna & Western Railroad Co. consist of the William A. Connell, the National, the Meadow Brook and the Lawrence shafts and drifts.

The purpose of the railway company in buying the land, it is understood, is not with the sole view of obtaining the coal lands, but to enable it to work property of its own that adjoins the Connell lands more advantageously and at less cost.

The passage of the coal lands out of Mr. Connell's control recalls the story of how a slate-picker rose to be a millionaire, a congressman and the largest owner of real estate in the city of Scranton. Mr. Connell was born at Cape Breton, Nova Scotia, Sept. 10, 1827, his parents being of Scotch and Irish descent. When he was yet young his parents moved to Hazelton, Luzerne county, where he worked in the mines as a driver boy at 75 cents a day. In 1858, having shown the ability to hold his own in life, he was placed in charge of

the Susquehanna and Wyoming Valley Railroad and Coal Co., with offices in Scranton. In 1870, the charter of that company lapsing, Mr Connell purchased the plant with his savings and organized the firm of William Connell & Co., which has had an uninterrupted career of prosperity from that day to this.

The Connell coal property will be developed in harmony with the energetic and scientifically pre-arranged plans that Lackawanna is bringing into operation in the operation of its vast anthracite properties. Already arrangements are under way to equip the old Connell mines with modern machinery.

A new device for removing the dust from breakers has recently been put to test in one of the breakers of the Pennslyvania Coal Co., near Pittston, and has proved to be a success. By the new arrangements the dust from the breaker is drawn into the pipes and is carried some distance from the breaker before being allowed to get out into the air. In order that the pipes may not be blocked, the exhaust from the engine is forced through them and water also flows through the pipes.

Chief Roderick, of the Department of Mines, appears to be in favor of an amendment to the miners' certificate law that will make the members of the miners' examining boards employees of the State, and paid by it for their services instead of receiving a fee from each certificate issued, as is the case at present. It is believed that by this method the temptation to issue certificates for the sake of fees would be eliminated, and as the certificates would be issued by the State and with the State seal attached, there would be less liability of their being counterfeited. This method would also make somebody responsible for the issuance of the certificates.

The Lehigh & Wilkes-Barre Coal Co. has built a narrow-gauge track parallel with Nanticoke branch of the Central Railroad of New Jersey between the Maxwell colliery No. 20 of Ashley, and No. 9 colliery of Sugar Notch, where the breaker was recently destroyed. It is the purpose of the company to convey coal from No. 9 Ashley to the Maxwell at Ashley for preparation for market, until the new breaker is constructed. The foundations are being cleared preparatory to the erection of an up-to-date breaker in place of the old one recently destroyed. The men at No. 9 have been idle since the breaker burned down several weeks ago. The output of coal will not be to the full extent that was mined before the fire, but it will be considerable and several hundred men will find employment until the new structure is ready, a year hence, in preparing the coal of No. 9 colliery.

The strike of the miners at the mines of A. D. & F. M. Spencer, in Dunmore, is still on. The men have finally refused to go back to work under the new system of paying.

Duluth. June 5.

Mine equipment for stripping the Standard mine, Cascade district, has been shipped in from Iron mountain, and is being put into use. This mine will not be as large a shipper this year as had been expected, but will produce about 25,000 tons and may double that in 1906. It is an easily-mined proposition, as most of the ore is close to surface and can be produced in large tonnage at slight cost. The future of these lean ore deposits of the Cascade district is not appreciated by most mine operators, but that it is very important there is no doubt.

A great deal of work is under way in this district, by large operators. The Oliver Iron Mining Co. has been opening the Moore by stripping and is to mine a large amount of ore there this year. The Jones & Laughlin Steel Co. has the rolling mill and is beginning to sink an 800-ft. shaft to find the better ore its diamond drills disclosed at depth. The Cleveland Cliffs company has mines there, and several independent operators are working in the region, and now come Kimberley and Jones, who take up more and prepare to open them at once. The district will see a larger year than it has had for a long time.

Around Republic and Champion there is considerable activity. Nothing is doing at the former place other than the work of the old stand-by, the Republic Iron Co., but it is pushing developments and mine operations. The Kloman, of which great things were heard a few months ago, is absolutely idle, and is likely to stay so. At Champion the Oliver company is to instal a new and larger pumping plant and will take away the large surface stocks of ore in preparation for heavy mining there the coming winter.

In the vicinity of the St. Paul and Lackawanna is the Forest, a small mine operated by the Tesora Mining Co., which is being stripped and enlarged considerably. These are the only mines between Stevenson and Nashwauk, a distance of 10 miles.

The Cleveland Cliffs Iron Co. is considering reopening the Crosby mine at Nashwauk, Mesabi range, and may mine a small amount of ore this year. The company has a few small ore-deposits on the Mesabi.

Water is out of the Mansfield mine, at Crystal Falls, and the property will be put into shape for resumption of mining as soon as possible. The new shaft, which was not quite completed at the time the old one was wrecked, will require some work to make it ready for operation. The water has been taken out by bailing and was 750 ft. deep in the shaft. The large pumping plant that was in the old shaft and was drowned out there last winter, has been taken to surface and will be installed at the new shaft. The Crystal Falls district is very active now, and more ore will be mined there, and more development done this year than for a long time. There is good ground for exploration in the district, and much work will be carried on there during the year. Crystal Falls mine itself is idle, on account of the negotiations for a new lease, as the present one is about expiring. But it is thought that these negotiations have been about settled and that the papers will pass between the fee owners and Corrigan, *et al.*, in a few days. The Corrigan party has been in possession of the mine since 1895, when they paid something like $5,000 for the lease at a time when non-bessemer Menominee ores were not especially valuable, and when many mining men did not seem to think they ever would become valuable. Beginning with this mine, Corrigan, McKinney & Co. extended their operations, first on the Menominee and subsequently on the Mesabi, till they have become chief miners among the so-called independents of Lake Superior.

Salt Lake City. June 2.

The Consolidated Mercur mill is treating by cyanide 750 tons of ore daily, which is an increase over the tonnage handled a few months ago. It is stated by Geo. H. Dern, the manager, that the earnings of the company for the year ending June 30 will amount to over $175,000; that the ore now being treated is of higher grade than that milled last year, and that the percentage of extraction is higher. At a meeting of the board of directors, May 15, it was decided to resume paying dividends, and $25,000 will be paid quarterly, the first dividend to be on June 6. It is claimed the developed ore reserves are such as to assure heavier production for the ensuing year.

Ore shipments from the various mining districts of the State indicate a steady, normal output generally, with a perceptible increase at some points. The greatest increase is in the Bingham district, whose shipments to mills and smelters amount to approximately 100,000 tons of ore per month. With the erection of a second concentrating plant by the Utah Copper Co., to handle 6,000 tons of ore per day, as contemplated, and the building of a concentrator of 2,500 tons' daily capacity by the Boston Consolidated, plans for which have been made, the tonnage of Bingham district will soon be more than doubled. At the same time comes the announcement that the American Smelting & Refining Co. and the United States Mining & Smelting Co. have each decided to increase its smelting facilities in Salt Lake valley, both as to copper and lead smelting. The demand for additional copper furnaces in the valley is due chiefly to the tremendous development of copper ores in Bingham district, though the heavy production of the Cactus copper mine in Beaver county is a factor. Prior to the starting of the concentrating mill of the Utah Copper Co., the milling of Bingham ores was not much considered, but it is now clear that event-

ually the bulk of those ores will be concentrated before smelting.

Ore and bullion settlements for the month of May aggregated $2,134,500, which gives rise to the prediction that settlements for the year 1905 will average $2,000,000 per month.

Butte. May 30.

The Reins Copper Co. is preparing to operate its property on a large scale. John H. Galey, of Pittsburg, who is associated with J. M. Guffey in mining enterprises in 13 States and territories, and who is also a heavy holder of stock in the Reins, spent last week in Butte and while here arranged with the officers of the company to sink the shaft from the 800 to the 1,200 mark and add another compartment from the surface, which will give it three. The property is to be equipped with heavier hoisting machinery and another new pump. No crosscutting will be done until the 1,200 is reached. The decision to do this work was not arrived at until Mr. Galey had made a thorough examination of the mine, and other mines in the vicinity, and concluded that the Reins had a future. He and Mr. Guffey will supply the capital for the work. It is estimated that it will cost about $10,000 per month, and that at least six months will be consumed in the sinking and enlarging. The machinery will cost about $40,000.

The North Butte Copper Co. has made its third payment on the purchase price of the Speculator property and will pay the remainder of the money in a few days. The last payment aggregated $1,900,000, making a total of $3,000,000 of the $5,000,000. Captain Hoatson, of Calumet, Mich., on whose recommendation the property was bought, is in Butte again on business connected with the new company. He has been examining outside prospective copper mines, those of the Corbin-Wickes district in Jefferson county in particular. He returned from that section yesterday. The surface showing there is good, but not enough development work has been done on any of the claims to demonstrate their real value. One company is prospecting with a diamond drill.

In the northern part of the Butte district there is considerable activity. The Berlin company, organized recently to develop a group of five claims, has commenced sinking its shaft and will go to the 500 before doing much other work. Several claims farther north, which were located 25 years ago and abandoned because they did not show good results in silver, have been relocated during the last few days and thrown on the market as prospective copper producers.

Heinze is sinking the shaft on the Minnie Healey, his intention being to add 200 ft. to it, which will make it 1,300. The Minnie Healey is an irregular fractional claim containing 4.19 acres and one corner of the shaft is on Boston & Montana ground. It is not a heavy producer of ore at present. No ore was taken from Heinze's Belmont claim last week. His Corra, Rarus and Minnie Healey are supplying the United Copper smelter with ore. The plant is not being operated full blast, but the company expects to increase its production as soon as the Minnie Healey is opened up at the 1,300.

Bisbee. May 29.

The Cananea & Duluth Development Co. has been organized to take over two groups of claims that were taken by J. W. Power, of the latter city, some months ago. These groups are the Swansea and Dos Naciones, and lie up against the Cobre Grande of the Cananea Consolidated. The company is organized with 40,000 shares of $10 stock, and the property is to cost the promoters about $60,000. It is quite probable that ore runs across the Swansea ground from Cobre Grande, but work on Naciones is not sufficient to determine what is there.

Calumet & Arizona has declared its regular $2 quarterly dividend, making $2,500,000 since December, 1903, and giving a surplus of about $2,200,000 above this dividend. This has all come out of the Mag shaft, which is hoisting about 700 tons of ore daily. This company and its affiliated concerns are employing about 2,000 men at mines and smelter, most of the number in the development of the Lake Superior, Junction, Duluth and Pittsburg properties, and in the exploration of the Senators claims of the Calumet & Arizona itself, as well as the crews at smelter.

Sinking has been resumed at Briggs shaft of Pittsburg mine after a wait of six months or more, and it is generally believed that the water has been so far overcome that sinking may be continued steadily to the 1,100-ft. level where drifting will begin. The Hoatson shaft on the same property is now down about 100 ft., and it is the intention of the company to make a record for rapid sinking here. It is rumored that the company is to issue a part of its treasury stock at $20 a share to pay its debts and provide for the further extension of underground operations. At the commencement of the year this mine owed $112,000 and has been going in debt since then at the rate of about $20,000 a month. Its assets are very large and its property is worth many millions, while it has been able to borrow from affiliated companies. Its stockholders will jump at the chance to secure new stock at double the par value of $10 per share. The directors, however, have not formally discussed an increase of capital.

That such an issue of stock would be wise, under the circumstances, there seems to be little doubt. The stockholders undoubtedly feel confidence in the enterprise, which is warranted by the experience of other companies in the district. It would seem that the property will be able to carry the additional stock.

Goldfield. June 4.

A stampede is on to get into the Lida district, 25 miles southwest of Goldfield. Where two months ago inactivity prevailed, 20 properties are now under active development. A townsite has been laid out, and Main street lots are selling at $1,000 each. The Lida country, which is about 15 miles from Tule cañon, is an old proved mining district that was under development 30 years ago, but has since been neglected for want of railroad facilities for ore shipping. Now that a railroad is being graded into Goldfield and shipping facilities are promised within a few months the problem of mining the immense orebodies of the Lida and Tule cañon districts has been apparently solved. Mining engineers report that the orebodies are all low grade, but are immense in tonnage, and that shipping facilities alone have been necessary to guarantee profitable mining there.

J. Sloat Fassett, of Elmira, N. Y., has formed a co-partnership here with Kenneth Donnellan, of Sandstorm fame, and they have incorporated the Kenneth Donnellan Co., with a capitalization of $200,000 to transact a mining and brokerage business in Goldfield, Tonopah, Rhyolite in the Bullfrog district, and New York. J. Sloat Fassett will be in charge of the New York office. Arrangements are being made for through private wires for New York, Philadelphia, Pittsburg, Chicago and San Francisco.

The enormous vein on the Montgomery-Shoshone property, on Montgomery mountain in the Bullfrog district, in which sensational values of $6,000 per ton have been obtained, has been uncovered for a distance of 93 ft., without any indication of a foot-wall being reached. The winze is now down 50 ft. and is in quartz and porphyry, the ore showing free gold in abundance, and the values increasing with depth. Twelve hundred sacks of ore lie on the dumps ready for shipment to the smelters at Salt Lake City. This ore has been sacked in the course of development work, without sorting or sampling.

Work on the Campbell tunnel, on the south end of Montgomery mountain, on the property of the Montgomery Mountain Mining Co., is proceeding day and night. It is given out by the management that the Shoshone vein, which is traced by croppings over the property for a distance of over 1,500 ft., will probably be encountered at from 150 to 200 ft. in. The tunnel is now in 60 feet.

Another sensational strike is reported on the property of the Bullfrog National Bank Mining Co., which is situated on the north half of Ladd mountain, near Rhyolite.

A strike is reported on the Schwab-McKane property in the Bullfrog district, known as the Crystal Mining Co., that adjoins the Shoshone National Bank property, a few hundred feet distant from Montgomery mountain. It is believed that

the famous Shoshone vein which penetrates Montgomery mountain runs through both the property of the Schwab-McKane syndicate, and that of the Shoshone National Bank Mining Company.

Interest is reported to be widespread in Tonopah over discoveries made on Gold mountain, 7 miles south of Tonopah, and 20 miles north of Goldfield, on the property of the Tonopah Gold Mountain Mining Co. This company owns eight claims, or practically the entire mountain. 'Jim' Butler, the famous discoverer of the Mizpah, and 'Billy' Douglass, owner of the Tonopah reduction works, together with George Wingfield and Emil Sutro, own a controlling interest in this property. A few months ago, Owen Owens, superintendent, reported that the property would make a great mine. Since then development work has been going on night and day. A crosscut tunnel is now in 100 ft., and drifts have been made on the vein for a distance of 600 ft. The vein is from 5 to 6 feet wide. Seven grab samples of quartz give an average assay of $102.10. The highest assay was $392.41, and the lowest $7.75. The ore is described as a talc, identical with that of Montgomery mountain in Bullfrog, except that it carries more iron. The vein on Gold mountain can be traced by croppings for a distance of over a mile.

Sudbury. June 2.

Frank Cochrane has been sworn in as Minister of Lands and Mines. Charles Lamarche, member for the district of Nipissing East, has resigned his seat in the House, thus making a vacancy for Mr. Cochrane. The portfolio is without doubt the most comprehensive and important one existing in the province, and a wise selection has been made by the Premier. Considerable criticism is offered by the daily press, advocating and endorsing a lawyer for the position and a lawyer only.

The rush of prospectors to the Timiskaming region is exceedingly large, and there seems to be considerable discontent prevailing among the prospectors, who, after finding a claim and proceeding to record it, are discouraged by the fact that they have located on some quarter section held by a veteran. According to the Veterans Land Grant, the latter are entitled to all the mineral that may be in or upon the land, and much dissatisfaction and confusion exist.

The Paton location at Whisky lake has been optioned and work under the superintendency of John A. Montague has begun. A drift will be run from the main shaft to the south of the property.

The Shakespeare gold mine continues to ship bricks, and every month adds to the output; the new machinery has been established. Other companies in the immediate vicinity are preparing for operations and a lively season is anticipated.

Very little prospecting is being done at present in the immediate vicinity of Sudbury, the attention of the prospectors having been forgotten by the advent of the silver discoveries in Timiskaming. The majority of the prospectors have taken themselves to the latter country.

The several mines in operation here seem to be as active as ever, and the stability of the nickel industry is becoming more and more established. The Canadian Copper Co.'s mines are in full blast at Copper Cliff as well as the Ludwig Mond smelters at Victoria mines.

So far the Gertrude and Elsie mines have not resumed operations; they are properties held by the Lake Superior Corporation.

Toronto. June 3.

The Acadia Coal Co. has struck coal in its No. 2 Allan shaft, at Stellarton, N. S. From the portion of the seam uncovered, the coal appears to be of even superior quality to that mined from the same seam in the Foord pit. Two shafts have been sunk of 12 by 22 ft., one for hoisting and one for ventilation. With the completion of the necessary development and surface equipment, the company can quadruple their present output. The mine will have a capacity of 240 tons per hour.

Natural gas has been laid out at St. Catharines, Ont., the work of piping having been completed, and is proving highly popular, as the price for artificial gas is $1.50 per thousand ft., while the natural gas is sold at 40c., with 10 per cent discount for prompt payment.

The production of oil in the Leamington district is steadily increasing. Six new wells were drilled during the last eight days of May. During that month the shipments from Leamington amounted to 118 tanks, averaging 150 bbl. each, which does not include shipments from adjoining points. The net profits of one company's sales during the month amounted to $13,500.

A. E. Vaughan, representing the American Institute of Mining Engineers, was in Montreal this week, arranging with the Canadian Pacific railway management the details of a trip which that body will make from Vancouver to Portland, Me., on the return from Dawson.

The provincial bureau of mines has made arrangements for carrying on during the present season a systematic exploration in several directions in New Ontario, including both mineral-bearing regions and parts believed to be mainly agricultural. A party in charge of Dr. A. P. Coleman, who has already gone over part of the field, will be sent into the Michipicoten mining division to complete the investigation of the iron ranges. H. L. Kerr, geologist, of Toronto University, assisted by Archibald Henderson, an agricultural expert, late of the Ontario Agricultural College, will be in charge of a party which will explore the region west and northwest of Lake Abitibi, where a considerable section of the great clay belt will be surveyed into townships for settlement. The work in the district near Chapleau station on the Canadian Pacific railway, in the vicinity of which iron ores are known to occur, will be in charge of Benjamin Tett, of Newboro, Ontario.

The Inter-West Peat Co., of Winnipeg, is endeavoring to stimulate interest in the development of the numerous peat beds by calling attention to the great commercial possibilities in the utilization of peat, not only as fuel but in many branches of manufacture.

The first annual meeting of the Tabor Coal Mining Co. was held at Winnipeg on May 26, and the following directors elected: J. S. Hough, D. C. Adams, J. W. Bettes, Isaac Cockburn and George Rogers, of Winnipeg; L. M. Johnston and H. E. Cherry, of Lethbridge. The directors elected J. S. Hough president, Isaac Cockburn vice-president, and D. E. Adams secretary-treasurer. The company is already shipping coal and is installing sufficient machinery to produce 1,000 tons daily by the end of the month.

Victoria, B. C. May 29.

A meeting of local members of the American Institute of Mining Engineers was held at Victoria on May 27 to consider matters in connection with the announced visit of the institute to Victoria. W. F. Robertson, provincial mineralogist, W. M. Brewer and W. J. Sutton were appointed a committee to wait upon the provincial government, city council and board of trade to ask their co-operation in making suitable preparations for the reception and entertainment of the visitors expected to spend July 1 to 5 in Victoria, when *en route* to Alaska and Yukon territory.

This will be a record year for Dominion government geological work in British Columbia. Dr. Robert Bell, director of the Geological Survey of Canada, is sending 17 men from his department to work in this province; besides these, five go to Yukon territory. Dr. R. W. Ells and Dr. H. S. Poole are to examine and report on the coal resources of Graham Island, of the Queen Charlotte group, and Vancouver Island, respectively. Both have arrived at the Pacific coast, and Dr. Ells has gone north to the scene of his labors on Graham Island, while Dr. Poole, after a stay of a few days in Victoria, leaves for Nanaimo tomorrow, to there begin preparations for his season's field work. The coalfields on Vancouver Island are the oldest worked of any on the Pacific coast seaboard. There were years ago elaborately examined by the Geological Survey —(1) by James Richardson, as to the coalfields of Nanaimo, Comox, Cowichan and Sooke (see Geological Survey of Canada: Report of Progress for 1876-77, pages 160 to 192); and (2) by Dr. G. M. Dawson, as to the northern portion of Vancouver Island and adjacent coast.

The Western Fuel Co., of San Francis-

co, Cal., which at the close of 1902 acquired from the New Vancouver Coal Co., of London, England, the Nanaimo collieries, Nanaimo district, Vancouver Island, is making preparations to close down No. 1 shaft, Esplanade, Nanaimo, where are the principal workings of these collieries. The reason for this action is stated by the company to be the coming into operation on June 1 of the amendment to the Coal Mines Regulation Act, which makes an 8-hour day 'from bank to bank' compulsory. As previously mentioned in a letter published in THE ENGINEERING AND MINING JOURNAL of April 13, the Western Fuel Co. has been able to successfully compete for a large share of the Californian coal trade under conditions heretofore existing—an 8-hour day from bottom of shaft—but it was plainly stated at the time this then-proposed amendment was before the local legislature that if the amendment became law some of the island coal mines would be closed and would remain idle until this provision, which involves working certain mines at a loss, shall be repealed or otherwise become inoperative. The Western Fuel Co. last week intimated to its men that the alternative to closing down No. 1 shaft was either wages must be reduced 10 per cent or the men must enter the mine by Protection island shaft and pay the cost of ferrying between Nanaimo and the island. There are two union organizations whose members would be affected by the changes offered as alternative to a closing down; these are the local branches of the Western Federation of Miners and the United Mine Workers of America. They are working in harmony, and at a meeting held on May 27 appointed a committee to convey to the manager of the company their decision not to accept a reduction of wages nor to agree to pay the cost of transportation to and from Protection island, though they would be willing to enter the mine at the island shaft if the company provide transportation. Notices have been posted in No. 1 shaft ordering the men to square up their work and remove their tools, the mine to close down on the afternoon of 31st inst. The work of removing the pumps from No. 3 level was commenced this morning. The company has published a statement in explanation of its action. It says the conditions now being faced were forced upon it in spite of its timely protest, and with an utter disregard of the predicted results the new law would impose upon the coal-mining industry at Nanamio. Under the law, as it stands today, the actual working time is 81 per cent of the 8-hour day; under the amendment about to come into operation, this will be reduced to 74 per cent. Twenty-five per cent of the mine product under existing conditions is disposed of at a loss; 30 per cent of the lump coal sent to San Francisco becomes screenings when the coal is cleaned for domestic uses, and the screenings are sold with difficulty and always below cost. The change in the law, the company contends, will wipe out the narrow margin of existing profit; hence the decision, after full consideration and careful calculation, to close No. 1 shaft until conditions shall be more favorable to its operation. No information has yet been made public as to the effect the change in the law will have upon the Wellington Colliery Co.'s mines, which, however, are not affected to the same extent as the shaft mines of the Western Fuel Company.

London. May 27.

About two years ago I called attention to the flotation of the San Francisco del Oro Mines, Ltd., which was formed to take over the mines of that name in Chihuahua, Mex., some 14 miles southwest of Parral. The mines had been worked for some years by local owners, who had extracted all the best carbonate ore, and who, seeing that profits were coming to an end, promptly sold to the first Englishman that came along. At the time of sale it was obviously one of those hopeless refractory propositions that Englishmen have a fatality for getting hold of in Mexico. The directors, when floating the company (naturally there were two noblemen on the board), presented a most remarkable statement in connection with the value of the ore, the fallacy of which the veriest tyro in metallurgy could have pointed out. They took the analysis of the sulphide ore, showing 30% zinc, 12% lead, 1% copper, with gold and silver values, and basing calculations on the market price of each metal, added all together, making a grand total for the value of the ore. Events have fully justified my prediction made when writing about the formation of the company. Such carbonate ore as was left by the former owners has been picked out and sold, and no market has been found for the sulphides. Finding themselves in a mess, the directors requisitioned R. J. Frecheville to examine the mine and report. The opinion expressed by Mr. Frecheville is that £175,000 new capital will be required for the purpose of developing the mine, erecting concentrating plant and building a railway. He also makes some characteristically strong remarks about the way in which the eyes of the mine have been picked out. The directors are now trying to raise £150,000 new capital for the purpose of carrying out the suggestions and recommendations of Mr. Frecheville. But the query presents itself, if the directors ask for Mr. Frecheville's opinions and recommendations, why do they not adopt them in their entirety? He mentions £175,000 as the sum required, but the directors think they can do it for less, forgetting also that after the equipment has been provided, they will want more money still as working capital. Another interesting item of news in connection with this company is that a large number of subscribers have refused to pay their calls since allotment. The directors give various excuses for not being able to get the remainder of the capital out of these subscribers, but in my opinion these delinquents showed a considerable amount of wisdom in taking the course they did.

During the past few weeks, I have referred briefly to the results for 1904 of the leading West Australian mines. The last of the series to publish its report is the Great Boulder Proprietary, of which Richard Hamilton is manager. This company produced bullion valued at £564,000, and made a net profit of £357,000, which was practically the same as in the previous year. The company has been paying dividends with the greatest regularity for the past 10 years, in all amounting to 1,120% on a capital of £175,000. The amount of ore treated per annum is about 110,000 tons, and on December 31 last the ore reserves were estimated at 380,000 tons, averaging 22.8 dwt. per ton. As developments continue favorable, the mine has evidently many years of prosperity before it.

Johannesburg. May 8.

Political matters have usurped mining as the chief topic of conversation. The long talked of constitution for the Transvaal has at last been launched by the home government. Comments on the subject have been numerous, the majority agreeing that it is satisfactory. The framers of the document must have spent enormous labor and pains on this constitution for the Transvaal.

Preparations are being made to give Lord Milner's successor, Lord Selborne, a royal welcome on his entry into the Transvaal as High Commissioner for South Africa. His Excellency has a difficult outlook, but so full of interest is the position that to a man of his attainments, it must appear one of the best posts in the Empire. Lord Selborne will live at 'Sunnyside,' in the most fashionable quarter of Johannesburg. This beautiful place was formerly the home of Mr. Hennen Jennings, but the government has taken it over as the residence of the High Commissioner.

The inevitable reaction in 'Sallys' (the favorite tin share on the Johannesburg stock exchange) has set in, the shares standing for a week in the neighborhood of 50s. The gambling craze in this stock seems to be abating. The variety of reports handed in by different competent engineers is bewildering. Some experts who have visited the tin prospects declare the reports issued as to 'unprecedented richness,' etc., to be unsupported by facts. Other engineers still maintain that it is one of the most remarkable tin finds of modern times. It is a case of 'pay your money and take your choice,' so far as opinions are concerned. On account of the divergence of the reports, the farm on which the tin occurs has been named 'Mys-

terious Vlaklaagte.' Here are quotations from reports of different engineers who have seen and examined the deposit. Mr. Troye said he saw a "truly marvelous prospect, quite unparalleled in the history of reef tin." Mr. David Draper, a well-known South African geologist, is convinced "that the lode is a permanent one, and that it will yield a high average over areas of great extent." Dr. Jorissen, a geologist, contends that "the strike is decidedly a promising one." Mr. Bettel, a well-known analyst, believes "that the enormous extent and value of the stanniferous deposit is barely exceeded in importance by the deposit of gold in the Witwatersrand formation." Dr. Carrick, geologist, considers that "it would be a pity if the public of Johannesburg could be bluffed out of its belief in what is, perhaps, next to the Witwatersrand, the most valuable mineral deposit in South Africa." Dr. Molengraff, probably the greatest authority on South African geology, says in his report: "I think it premature to speak of a rich tin field just yet, especially since the samples of greisen collected by Mr. Hoffman at several points of the outcrops of tin gave slight results—in fact, hardly any at all—outside the rich patches." And again: "It is, of course, encouraging that with the little work so far done several rich patches have already been found in different parallel belts of greisen."

These quotations from an article in the *Rand Daily Mail* give one an idea how difficult it is to decide as to the new tin discovery. One must choose from the different reports. From what I know of South African mining, I feel forced to accept Dr. Molengraff's views, believing that to call Vlaklaagte a great tin-field is distinctly premature. The most that can be said is that the prospects are decidedly encouraging. The Johannesburg community are greatly involved in this tin enterprise. People who can ill-afford to loose money, such as shop-girls, clerks, etc., have put their savings into the venture, being dazzled by the prospect held out by 'Sallys.' It will be a calamity if 'Sallys' fizzle out.

Melbourne. April 30.

The Broken Hill Proprietary Co. has definitely decided to enter the market as zinc smelters. That decision has been made because of a determination not to let the European zinc smelting combination appropriate all the profits derivable from a favorable market for spelter. The company's chemist, Mr. Bradford, has been investigating zinc smelting while in Europe, attending the commission appointed to take evidence in respect to Potter's claim that the Delprat salt-cake process for the treatment of zinc concentrate infringes his patent rights. The Broken Hill Proprietary Co. is an exceptionally strong concern, but it is entering upon the enterprise on a small scale—an output of 100 tons of spelter per week—so that it may go slowly but surely. The process to be adopted is to be on European lines, and the works are to be at Newcastle, so as to be alongside the coal mines. A difficulty the company has to overcome is to find suitable material for the retorts. At the Sulphide Corporation's works, at Cockle Creek, supplies of fireclay from all parts of Australia have been tried, but none of it has been up to tiptop standard.

The striking of Cohen's lode at the Long Tunnel mine, Walhalla, at 2,350 ft., is the reward of well-directed perseverance. The company's mine paid over £1,500,000 in dividends from a quartz vein worked down to 2,100 ft. Then the grade fell to 10 dwt. As the ore had to be hauled up a blind shaft 1,200 ft. deep, trucked along a drive 2,500 ft. in length, to No. 1 shaft, hauled 900 ft. to a tunnel and trucked 500 yd. to the battery mining, such material did not pay; so the company re-formed, contributed £40,000 to sink an incline shaft to strike the lode at 2,200 ft. on the vertical, or over 3,300 ft. on the incline. It has been fortunate in opening up a new shoot of stone, worth 15 dwt., away from its old north workings, and so promises to have a new mine, apart altogether from the shoot the incline shaft was designed to strike.

The Minister of Mines is dealing with a very vexed and interesting question. In Australia all the gold is the property of the Crown, and in some of the States a royalty per ounce is imposed just to let the miner realize the ownership. In Victoria, however, no royalty is charged, but the State sees that mining is conducted under suitable conditions and on terms that are in consonance with the terms of the mining lease issued by the Mines Department.

Recently there has been an outcry against holders of leases who have sublet to companies the right to mine on the condition that they pay a royalty on gold won. Some of the companies which consented to pay this royalty are objecting to the impost, and the minister is taking up their cause, overlooking the fact that they entered into their agreements with their eyes open. The result of his attitude is that the Hustlers Reef No. 1 Co. at Bendigo has been refused a renewal of its tribute by the parent company. Therefore shareholders who a short time since paid 20l for their shares stand the chance, unless the matter is gone into again, of losing their mine in twelve months' time, when their term of tribute expires. The tribute company paid over £80,000 in dividends out of the area held on tribute, and the company got about £9,000 in royalty. It is proposed in the future to exact a 15% royalty, but the minister refused to assent to this charge. Result: loss to the No. 1 shareholders and a general disinclination on the part of mining companies to let tributes.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. J. H. Curle is in Paraguay.

Mr. A. B. Frenzel is in New York.

Mr. J. Morgan Clements is in Sonora, Mexico.

Mr. H. A. Pringle has returned to England from Rhodesia.

Mr. Thomas Hewitson, of Kalgoorlie, is on his way to London.

Mr. J. F. Larson has left Melbourne on his way to Montevideo.

Mr. Charles M. Fassett, of Spokane, was recently in New York.

Mr. G. C. Cossar, a Scotch mining engineer, is at Oaxaca, Mexico.

Mr. James M. Hamilton is at San Juan del Rio in Queretaro, Mexico.

Mr. Hal. W. Hardinge left New York this week on his way to London.

Mr. Charles Taylor is in charge of El Oro mine, Poza, Sonora, Mexico.

Mr. G. M. Gouyard is at the Tiro General mine, near Aguascalientes, Mexico.

Mr. A. O. Cautley arrived on the *Oceanic* and proceeded to Monterey, California.

Mr. H. A. Wheeler has been examining zinc properties in the Wisconsin district.

Mr. Chester W. Purington is examining mines at Eureka, near Silverton, Colorado.

Mr. William Thompson is engaged as mining engineer at Ocampo, in Chihuahua, Mexico.

Mr. H. W. Morse has been appointed general manager of the Morning mine at Mullan, Idaho.

Mr. H. E. Carey has returned to New York from the Lluvia de Oro mines, Chihuahua, Mexico.

Mr. Arthur Thacher, of St. Louis, has been reporting on asphalt deposits in the Indian Territory.

Mr. Leo von Rosenberg, of New York, is in the San Juan district of Colorado on professional business.

Mr. Frank H. Probert, of Los Angeles, is examining mines in the Santa Rita district, New Mexico.

Mr. Austin King has resigned as superintendent for the Dominion Coal Co., of Sydney, Nova Scotia.

Mr. Harold C. E. Spence arrived at Boston by the *Saxonia*. He is on his way from Paris to Mexico.

Mr. E. Gribben has been appointed manager of the Durham Consols mine at Etheridge, in Queensland.

Mr. Edmund Beecher Wilson has been chosen dean of the faculty of applied science at Columbia University.

Mr. R. A. Linton has been appointed superintendent of mining properties in the State of Antioquia, Colombia.

Mr. J. E. Woodman, professor of geology in Dalhousie University, Halifax, is visiting Boston and New York.

Mr. R. J. Grant sailed from Fremantle, Western Australia, on May 10. He expects to reach New York in September.

Mr. W. S. Morse, general manager of Southern department of the American Smelting & Refining Co., is in New York.

Mr. A. P. Coleman will be in charge of a party to examine the iron ranges of the Michipicoten division in New Ontario, Canada.

Mr. J. A. Ingalls has been placed in charge of the properties of the Majestic Copper Mining & Smelting Co., in Blair county, Utah.

Mr. Thomas Lynch, president of the H. C. Frick Coke Co., has been inspecting the coal properties of the company on the Panhandle railroad.

Mr. H. L. Kerr, professor of geology in Toronto University, will be in charge of a party to examine the region around Lake Abitibi, Canada.

Mr. George W. Maynard has been elected an honorary member of the Alumni Association of the Schools of Science of Columbia University.

Mr. E. W. Sebben has returned to Denver from an inspection of the property of the Clover Mountain Consolidated Mining Co., in the Tomichi mining district.

Mr. A. H. Rogers has resigned as manager for the Velardeña Mining & Smelting Co., of Durango, Mex., to engage in the work of consulting engineer in New York.

Mr. Austin Flint Rogers, tutor in mineralogy in Columbia University, has been appointed assistant professor of mineralogy and petrography in Stanford University.

Mr. Robert McF. Doble, consulting engineer to the Abner Doble Co., of San Francisco, is in Mexico, for the purpose of investigating several important hydro-electric long-distance power projects.

Mr. Drew Haven Dunn has completed the examination of the property of the Peregrina Mining & Milling Co., at Guanajuato, Mex., and is now examining the Hardwick properties in the Ures district, Sonora. He will return to London early in July.

Dr. James F. Kemp has resigned the presidency and from the board of directors of the Philippine Gold Mining, Power & Development Co., and announces that the Manila agency of the corporation is abandoned. Hereafter and until further notice the affairs of the company will be conducted from its main office, 444 Parrott building, San Francisco, California.

Obituary.

Edwin Williams, a well-known mining man of the West, died on May 24, near Challis, Idaho. Mr. Williams was for many years manager of the sampling works at Boulder, Colo. He was 58 years of age.

Peter L. Kimberly died at Sharon, Pa., June 4, of apoplexy. He was prominent throughout the country in mining circles. Mr. Kimberly, who was 59 years old, was widely known, and an authority on mining. He had been interested in many mines in the West and was a pioneer in copper mining in the Lake Superior region.

Societies and Technical Schools.

American Foundrymen's Association.—This society held its eighth annual convention in New York on June 6, 7 and 8. Many valuable and interesting papers were read.

Colorado School of Mines.—The 31st commencement of this institution at Golden was held on May 26. Forty-eight graduates received diplomas. The honorary degree of mining engineer was conferred on Governor McDonald, in recognition of his work as a practical miner in the Leadville district.

Massachusetts Institute of Technology.—The balloting by the alumni of this institution for the proposed alliance with Harvard University resulted in a vote of 1,351 against the union, and 458 in its favor. Of 1,060 non-graduates 376 favored the plan, and 684 opposed it. From an analysis of about 500 letters received by the alumni executive committee, the minority favoring the alliance believe that the income from the Gordon-McKay fund would relieve the financial condition of the institute. The majority find that the proposed agreement is so vague and incomplete as to insufficiently safeguard the interests and independence of the institute. They believe the characteristic technology spirit and atmosphere of earnest work "would gradually deteriorate under the influence of an institution of alien temper and by contact with a body of graduates of less serious aim."

Trade Catalogues.

We have received the stock list of the Scully Steel & Iron Co., of Chicago, Ill., for May and June, 1905.

The F. M. Davis Iron Works Co., of Denver, Col., has issued a bulletin which describes the Ferraris ball mill.

The Ohio Brass Co., of Mansfield, O., is sending out a supplementary catalogue descriptive of its products. It is illustrated.

The International Nickel Co., of New York, has prepared a booklet which gives a list of the uses for which nickel-steel is adaptable.

The Ingersoll-Sergeant Drill Co., of New York, in its bulletin No. 2,001, describes, with illustrations, the Little Jap hammer drill.

Bulletin No. 52, of the Crocker-Wheeler Co., of Ampere, N. J., is devoted to railway generators made by that company. It is illustrated.

The Wellman-Seaver-Morgan Co., of Cleveland, O., has prepared an illustrated pamphlet, describing its water-power equipment for low heads.

The American Air Compressor Works, of New York, have published a bulletin, illustrating and describing a few of their new types of air compressors.

The Electric Storage Battery Co., of Philadelphia, Pa., in its bulletin No. 91, describes the chloride accumulator in the electrification of steam railroads.

The Stine mine fan for the economic ventilation of mines is described in an illustrated booklet, issued by S. B. Stine & Son, of Osceola Mills, Pennsylvania.

The drilling machinery, made by the Edward Christman Co., of Massillon, O., is described and illustrated in an attractive catalogue just issued by that company.

The hydraulic rams made by the Columbia Engineering Works, of Portland, Ore., are described and illustrated in a tasteful catalogue prepared by that company.

Morse, Williams & Co., of Philadelphia, Pa., have issued a handsome catalogue of their hydraulic, electric and steam elevators. It is illustrated, and contains many valuable tables.

The Yale & Towne Manufacturing Co., of New York, has issued two booklets, descriptive respectively of its locks, builders' hardware and door checks, and the Yale & Towne chain blocks.

The Aetna Powder Co., of Chicago, Ill., has prepared a booklet entitled 'Firing Blasts by Electricity.' It contains directions for the use of the Lion brand electrical fuses made by that company.

Industrial.

The J. F. Holbrook Co., of Los Angeles, has just installed a cyanide plant complete for Geo. M. Rose, in the Searchlight district of Nevada. The order comprised 20 tanks built of corrugated steel, and other appliances.

W. G. Schron, who has been in the employ of the Westinghouse Machine Company, as a salesman, recently entered the service of the Allis-Chalmers Co., of Milwaukee. He will make his headquarters at the Pittsburg office and devote his attention to the sale of gas-engines, steam-engines and steam turbines.

A. C. Bunker and W. C. Appleton, alternating current engineers, have become associated with the Crocker-Wheeler Co., Ampere, N. J., in the engineering and contract departments, respectively. Since the company took up the manufacture of

alternating current machinery eight months ago, its activities in this field have rapidly increased and have necessitated a corresponding development in the engineering force. Mr. Bunker has been connected with the Stanley Electric Mfg. Co. on the Pacific coast. Mr. Appleton has acted as engineering salesman for the General Electric Co. in the Atlanta territory.

The advantages of electric motor drive for auxiliary machines like pumps, blowers, conveyors, elevators, etc., include economical power and savings of time and labor. Motor drive affords economy and convenience because of the elimination of losses of power incident to transmission great distances by line shaft and steam pipes. Motor drive makes it possible for the machines to be arranged for remote control if desired, thus making it possible for the operator to alter the machine speed to suit the requirements of the work. The Northern Electrical Manufacturing Co., of Madison, Wis., are specialists in motor drive for all sorts of industrial plant machines and are prepared to aid customers in the application of motor drive in their work.

A. P. Head, the London representative of the Wellman-Seaver-Morgan Co. has just completed a tour around the world, and has established the following subagencies for the Wellman-Seaver-Morgan Co.: Melbourne, Australian Metal Co., as Australian agents; the branches of this concern are as follows: New Zealand, The Gilbert Machinery Co., Wellington; Queensland, James Stothert, Brisbane; N. Queensland, James Croker, Mackay; New South Wales, W. R. Laidley, Sydney; South Australia, James C. Fraser, Adelaide; West Australia, A. E. Thomas, Koolgardie; Tasmania, Lindsay Tullock, Launceton. In India the following agents representing the Presidencies of Bombay, Bengal and Madras, have been appointed: J. Harper, Calcutta; Frank Harrison, Bombay; W. H. Oakes, Madras.

The Joshua Hendy Machine Works, of San Francisco, are about to erect a three-story building on Fremont street, having a frontage of 92 ft. by a depth of 137 ft. It is proposed that this store shall be built on modern lines and the ground floor will be finished and equipped as a spacious showroom with convenient office accommodation, while the second floor will be devoted entirely to that of creamery supplies, for which this company has a considerable business in conjunction with the Sharples tubular separator. It may also be interesting to mining men generally to know that the Joshua Hendy Machine Works have just effected a shipment of two quadruple discharge individual mortar three-stamp mills, with a 60-ton cyanide plant, to Manila, and dispatched with this shipment an expert to erect and operate the plant in question.

General Mining News.

ARIZONA.

COCHISE COUNTY.

Paradise.—A new railroad has been incorporated under the laws of Arizona, and the right of way has been obtained. The incorporators state the road will be built at once upon the completion of a few necessary details. They are A. H. McKay, of Santa Barbara, California; B. F. Graham, J. A. Lewandowski, D. A. Richardson and L. C. Hauks, of Douglas. Richardson & Lockwood are the attorneys. The capital stock is $1,250,000. The road will start from Rodeo, N. M., which is a station on El Paso & Southwestern railway, and follow the San Simon valley in a northwesterly direction to Bowie, Arizona, a station on the Southern Pacific railroad. There will also be a branch that will run into Paradise, and tap this immense mineral section.

S. S. Badger has obtained a bond on the Copper Range group of 41 claims for Eastern people. This group lies west and adjoins the Sullivan group, which is owned by the Duluth & Chiricahua Development Co., and is situated on the Mother lode line belt of the district. There are two points on the property that have shipping ore to start on. The deal involves half a million dollars and will add a producer to the district.

CALIFORNIA.

AMADOR COUNTY.

Kennedy Mining & Milling Co.—The shaft at this mine, Jackson, Webb Smith, superintendent, now 2,700 ft. deep, is being sunk 100 ft. deeper. The crosscut at the 2,700-ft. level is 45 ft. from the shaft, and it is expected will strike the ledge soon.

Amador Gold.—The milling at this old mine is being dismantled and shipped to a mine in Calaveras county.

Central Eureka Mining Co.—At this mine, Sutter creek, the completion of the last 100 ft. of sinking makes the shaft 2,400 ft. deep.

CALAVERAS COUNTY.

Reed.—Rich gravel has been struck unexpectedly in this mine, at Central Hill. They were running a drain-shaft when they came upon the channel.

Yellow Boy Mining Co.—This company has been organized at Ogden, Utah, to operate the Buckhorn Consolidated group and Gum Boat mine, near Murphy's.

EL DORADO CO.

Union Mining Co.—This company has been organized by citizens of Placerville, to work a tract of gravel mining ground on Reservoir hill, near that place, F. P. Merritt, president; J. E. Fox, secretary, and D. Hartley, superintendent.

NEVADA COUNTY.

Posey.—This mine, Grass Valley district, W. H. Bray, manager, will shortly be started up again.

Home Stake.—The Ahern Bros. have just made a fine strike of $20 ore in this mine at Canada Hill.

SHASTA COUNTY.

Hazel Mining Co.—The new pole-line from the Balakalala sub-station to the Gladstone mine of this company, near French Gulch, J. O. Jilson, manager, has been completed. The company already owns an electric plant, but this new line will give additional power.

Mammoth Smelter.—The steel work is about completed, as are the bins for fuel and ore. The aerial tramway is in course of construction. The concrete smoke-stacks are completed.

Uncle Sam.—At this mine, Kennett, operations have ceased in order to expert the lower workings. Improved machinery will be installed and the mine worked on a more elaborate plan than heretofore.

Quartz Hill Mining Co.—A two-compartment shaft is being sunk on this mine, Old Diggings district. Manager C. A. Halten intends doing extensive work on the property. The mine has long been an extensive shipper to the Keswick smelters.

Mallard.—At this mine, Whiskeytown, owned by Messrs. Bush, Perry & Molin, the ledge has been encountered and assays $9.50 in gold and an ounce of silver per ton.

Gambrinus.—This mine at Whiskeytown has reverted to the owners, Barnes & Riebe, through failure of those holding the bond to keep up payments.

SAN DIEGO COUNTY.

Native Gem Co.—This company has been organized in San Diego and has closed a deal with the San Diego Gem Co. for the entire output of its mine at Mesa Grande for four years. The gems mined are tourmalines, and some extensive work is about to be done.

Owens Mining Co.—This property at Julian has been pumped out and the principal workings have been retimbered. Development work is now going on.

SACRAMENTO COUNTY.

Little Valley.—This mine, near Brandon station, now owned by Capt. E. Bright, is having machinery placed upon it and the shaft pumped out. The mine has been idle over twenty-four years.

SISKIYOU COUNTY.

Taylor Creek.—This mine on Salmon mountain has been bonded by Harris Bros. & Bassford to Frank C. Perera.

Ball.—W. H. Young, of the King Solomon Co., is pumping out this mine at Salmon river. The mine is in litigation, but suitable arrangements have been made with both parties.

SIERRA COUNTY.

South Fork Mining Co.—J. H. Hurin and E. H. Gardner, of Los Angeles, have reorganized the company having a bond on this property at Forest, have settled all indebtedness and are proceeding with development. The long tunnel, driven some

years ago by Oscar Jones, is being advanced toward the gravel channel.

Alleghany Mining Co.—This property, near Chipps, is being worked by 15 men, who have run a 900-ft. bedrock tunnel and two upraises.

Columbia Channel Gold Mining Co.—The tunnel of this mine, near American Hill, is in over 1,600 ft. and has 200 ft. more to be cut before reaching the channel. J. M. Harper is manager.

Diadem.—It is reported that this mine, at Forest, will be worked on a large scale this summer. Two-thirds of the mine is owned by Tod Sloan, and it is now idle.

Plumbago.—A strike of high-grade ore is reported in this mine, M. W. Mather, superintendent. A new wagon-road is being built to the Middle Yuba, where it will connect with the road to Moore's Flat, so that freight may come in from Nevada City via Moore's Flat, and one days' hauling be saved.

Tightner.—At this mine, owned by H. L. Johnson, of Alleghany, the ore is being dumped on a platform and hand sorted. A larger pump is being installed.

TRINITY COUNTY.

Hunter.—This mine, at New river, owned by J. F. Ladd, has been bonded to Robert Hicks, of Junction City, and two tunnels are being run.

Bob's Farm Mining Co.—At the Mountain Boomer, New river, owned by this company, James Byers, superintendent, an increased force of men has been put on and the mine is looking well.

TUOLUMNE COUNTY.

Densmore.—This mine has been bonded to Harrison Dibble and associates for $100,000.

Omega.—The main three-compartment shaft of this mine is being rapidly sunk. The vein is very wide. A carload of machinery has been shipped to the mine.

New Calico Mining Co.—This company, at Stent, now has its hoist in operation. J. H. Gerken is superintendent. Arrangements have been made for electric power.

Santa Ysabel Mining Co.—Drifting and crosscutting are being done and the shaft is to be sunk 200 ft. deeper.

Hidden Treasure.—The recently discovered vein in this mine is becoming larger and drifting is advanced.

YUBA COUNTY.

Black Swan.—At this mine, near Smartsville, a new stratum of good-paying gravel has been struck.

COLORADO.

BOULDER COUNTY.

Fourth of July Mining Co.—The power plant, consisting of compress or outfit and buildings of the Fourth of July mine, near Arapahoe peak, was destroyed by fire, May 27. The fire is supposed to have originated from a bolt of lightning. The loss is estimated at $6,000, and the plant will be replaced as rapidly as possible.

CLEAR CREEK COUNTY.

May Shipments.—From the Idaho Springs depot there were shipped during the past month 318 cars of smelting ores and concentrate, as against 125 cars for the corresponding month of last year; showing a gain of over 150 per cent, and the outlook is favorable for increased shipments, as several new shippers are being added to the list.

Bertha.—This mill at Idaho Springs has been leased by Andrew Anderson, who is overhauling it for amalgamating custom ores, for which it is specially adapted.

Terre Haute Mining & Milling Co.—This company has been incorporated by Boston parties, who have purchased the Big Clave group of claims up Fall river, for which they paid $5,000 cash. The White Star vein has opened up some good milling ores, and it is the intention of the company to erect a mill in the near future to handle their own ores. Ben. J. Martelou, Idaho Springs, is manager.

GILPIN COUNTY.

May Shipments.—The smelting and crude ores, tailing and concentrate shipped from Black Hawk depot of O. & S. road last month to Denver smelters and outside points of treatment were 300 cars, or 6,300 tons, being the heaviest shipping month for over two years, with one exception, and an increase of nearly 50% over the shipments for same month of 1904.

United Mining & Exploration Co.—A large body of free-milling ore has been opened in the 200-ft. workings, and daily shipments of two cords are being sent to the stamp mills, amalgamating 3 oz. gold per cord. Arrangements will be made to instal heavier machinery and erect larger shaft-buildings. J. Lyng, Bald Mountain, Colo., is superintendent.

Town Topics Gold Mining Co.—Lightning caused a fire which destroyed the shaft-buildings and damaged the machinery of the East Notaway mine May 28, entailing a loss of nearly $5,000, with $1,000 insurance. New buildings, to be 35 by 80 ft., are to be erected, and it is expected to have regular work in operation again inside of 30 days. The property is a dividend payer under the leasing system, with Eastern stockholders. S. A. Josephi, Barth Block, Denver, Colo., is president and manager.

Denver & Northwestern.—Large buildings for blacksmith shops and bunk house are being built up at the property on South Boulder creek, and good progress is being made with double shifts on a contract calling for 500 ft. of tunnel work. The company is figuring on the installation of a compressor plant in the future.

Aduddell.—It is reported that this group of claims, situated in South Willis gulch in the Russell district, has been sold by local and Denver owners to Eastern parties for the sum of $62,000, and that a strong company will be organized for the active operation of the property. The mines are to be connected with the Gilpin Tramway lines for future shipments, and some new machinery will be required for operations.

U. P. R.—Local parties have taken a lease and bond on this mine in the Gregory district, are installing machinery and erecting shaft-buildings and intend to do considerable work in the upper levels, where it is reported that there is virgin ground. Surface ores in the early days gave values of over 20 oz. gold per cord. M. Leahy, Central City, is in charge of work.

LAKE COUNTY—LEADVILLE.

The battle that is being waged in the Penrose against the water in the downtown section is one that is costing a mint of money, but the company will eventually win out. It is now found necessary to take the four sinkers out of the shaft and replace them with triple expansion pumps. To this end a large station is being cut a few feet above the present level of the water to accommodate the new pumps, and when finished the bottom of the shaft will be reached in a short time, as the pumps will have a capacity of 2,500 gal. per min. The effect of the work done by the Penrose is being felt all over the camp, as the Hoffer shaft in Big Evans is nearly drained and the Valentine shaft on lower Maple street is completely dry, while most of the shafts on Rock hill, at a depth of 750 ft., are without water. Fifteen years ago all of these shafts had to be abandoned on account of the heavy flow of water.

INDIANA.

Deeds for coal-mining property recently sold through John S. Bays, of Sullivan, to a syndicate of New York capitalists, incorporated under the laws of Maine as the Indiana Consolidated Coal Co., were executed in Sullivan on May 31, and $3,400,000 was turned over to Mr. Bays, thus consummating one of the largest coal-land deals that ever took place in the State.. The names of the purchasers have not been given out other than the directors of the corporation. It is intimated that the Rock Island, Vanderbilt or Pennsylvania railroad interests are back of the deal, since it is known that Dan C. Reed, of Richmond and New York, is interested in the purchase. The property includes the Green Hill company's mine, the Bogle company's interests, the mines owned by Harder and Hafer, and 8,000 acres of coal land owned by Mr. Bays, and a few other tracts.

Secretary Penna, of the Indiana Operators' Association, says the meeting of operators and commissioners of coal operators' associations in Chicago this week means that a national organization will be formed along the lines of the organization of the miners, and that its object will be to meet the United Mine Workers of America on equal terms. It is the purpose to create a court of appeals or a court of last resort, in which disputes may be finally adjudicated. As it is now, the operators

are organized by States only. A grievance arising in a State is adjusted by an agreement between the State officers of the miners' and operators' organizations. The miners 'appeal to John Mitchell,' as they call it, and the operators are helpless, except as they can set forth their case before Mitchell, who, they say, has set aside the State agreement in several instances.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—The Bass & Benckenstein pipe line from this field to the Mississippi has been tested with water and put in condition to forward oil this week.

Wilkins Oil Co. No. 2, which gushes at intervals, will be pumped.

CADDO PARISH.

Shreveport.—Producers Oil Co. No. 1, which was down 900 ft. with the 10-in. casing set, has been ruined by a tremendous blow-out, which threw the heavy rotary drill 40 ft. and demolished the derrick, machinery and connections. The roar of the escaping gas can be heard for eight miles. M. S. Jones & Co., of Toledo, and the Citizens Oil & Pipe Co. have filed applications with the city council for permission to lay mains for supplying natural gas.

MISSOURI.

ST. FRANCOIS COUNTY.

St. Joe Lead Co.—A meeting of the shareholders of this company has been called to absorb the Bonne-Terre Farming & Cattle Co. This is an offshoot of the St. Joe Co. that was floated in 1891 with a capital of $500,000 to take over the stores, cattle ranges and dwellings. The stock was given to the St. Joe stockholders as a stock dividend and has recently sold at $3 to $4. In the re-absorption, it is proposed to give one share of St. Joe stock, from the treasury, for two shares of the B. T. F. & C. Co., and this has suddenly advanced the latter to $8 to $10 a share. The St. Joe Co. has cut another melon by declaring a stock dividend of 25%, which nearly wipes out the treasury stock that resulted when the capital was increased from $3,000,000 to $6,000,000 some three years ago.

PENNSYLVANIA.

BITUMINOUS COAL.

The following have been appointed mine inspectors for the bituminous regions: First district, Henry Louttit, Monongahela; second district, Chauncey B. Ross, Greensburg; third district, Thomas K. Adams, Mercer; fourth district, Elias Phillips, Dubois; fifth district, Isaac G. Roby, Uniontown; sixth district, Joshua T. Evans, Johnstown; seventh district, John I. Pratt, Pittsburg; eighth district, Joseph Knapper, Philipsburg; ninth district, Thomas D. Williams, Johnstown; tenth district, Joseph Williams, Altoona; eleventh district, William J. Neilson, Wilson; twelfth district, Roger Hampson, Punxsutawney; thirteenth district, Alexander McCouch, Jr., Pittsburg; fourteenth district, F. W. Cunningham, Wilkinsburg; fifteenth district, Alexander Montieth, Patton; sixteenth district, David Young, Uniontown.

Mount Lookout.—The fan-house at this colliery at Wyoming was burned on June 5. The timbers of the main head shaft were also destroyed. The men in the mine all escaped through timely warning. The colliery is operated by the Temple Coal & Iron Co., and it will be idle for several weeks.

TEXAS.

HARDIN COUNTY.

Balston.—The Horkins Solinsky syndicate has brought in another well and now has a daily output of 1,800 barrels.

Saratoga.—The Guffey Petroleum Co. B. B. B. C. No. 2 is in and doing 2,000 bbl. Rio Bravo No. 222 came in one of the best gushers in the field. This company's No. 219 is producing 500 bbl. No. 224 has the strainer set and is expected in daily. No. 223 is down over 1,000 ft. and looking well. Other wells expected in this month are Sun Oil Co. No 2, Texas Crude Oil Co. No. 2, Little Jap No. 1, Rio Bravo No. 220.

HARRIS COUNTY.

Humble.—The output here continues very large. It is estimated at 60,000 bbl. and prices for crude have fallen .2c. to .16c. The troubles with salt water have not increased the past two weeks and the new gushers hold up the production. Flowing wells by means of compressed air has proven a failure and many wells are being pumped. Very few operators have made any money on account of the following conditions: the high price of land, the large initial production of gushers, the short life of the gushers which decline to small pumpers in a few weeks, the low prices paid for crude. These conditions naturally produce general discontent.

JEFFERSON COUNTY.

Beaumont.—The wells on Spindletop are yielding a steady output of about 5,000 bbl. daily. The crude market is very quiet and prices are unchanged except at Humble, which is lower. The tendency is for a further decline.

The Cameron Oil & Development Co., T. H. Dennis, manager, Port Arthur, has been chartered and will prospect the Johnson bayou field.

J. B. Treadwell has secured options on 3,000 acres of land in the oil belt (but not proven land) in Hardin and Liberty counties. The land in question is controlled by R. H. Kirby, of Houston, and if carried to completion the investment will be one of the largest ever made in Texas oil property.

LIBERTY COUNTY.

Dayton.—The Paraffine Oil Co. have succeeded in bringing in a well in this field. The well will be a pumper.

WASHINGTON.

FERRY COUNTY.

Oversight Mining & Milling Co.—The Oversight group, 10 miles northeast of Republic camp, in the Lambert Creek division of the Eureka mining district, consists of the Oversight, Granite, Great Northern, Erubescite, Troebite, Vulture, Buzzard, Wander, Emmett and Pin Money claims. These are traversed by a vein or veins carrying gold, copper and an excess of iron. The company is exploiting the group at present for the purpose of locating a site for a working shaft, where the property may be explored to best advantage. At the north end of the Oversight claim a vertical shaft has been sunk to a depth of 23 ft., mostly in oxidized iron ore of marketable value. An incline from the bottom is down 12 ft. in iron sulphide. A tunnel, driven south about 250 ft., terminates nearly under the shaft, without encountering ore, but oxidized iron ore has been crossed about 30 ft. wide from the bottom of the shaft, without disclosing a regular wall. It lies on a bed of limestone, which is regarded as the gangue of the vein. A drift runs 31 ft. northerly from the bottom of the incline on oxidized ore and terminates in magnesite and ore carrying 3% copper. The ore lies on the east side of a fault, which was followed in the tunnel mentioned. A large tonnage of desirable shipping ore lies on the dump, having a commercial value of about $8 a ton.

Copper Key.—This adjoins the Oversight group on the north and produces similar ore, of which 90 carloads have been shipped by railroad to the smelter. The lower tunnel is in over 400 ft. through limestone. It penetrates the hill from the east side and was expected to have encountered the vein (dipping west) long since, but appearances now indicate that the vein dips eastward.

Morning Glory.—The waste dump at the portal of the tunnel is being washed and ore assorted from it for shipment.

Ben Hur.—Good pay ore has been encountered in the north drift on the 115-ft. level.

California.—The superintendent reports the discovery of high-grade ore in connection with the old stopes. A carload was recently shipped, and another will follow in a few days.

ALASKA.

Alaska Copper Co.—This company at Coppermount blew in its smelter on June 1. The west orebody has been picked up on the 1,100-ft. level, with good values. The Corbin mine, ½ mile from the New York

ledge, is increasing in size with depth and in the drift also. The values vary from 4 to 15% copper, with $4 in gold. All the mines are getting ready to ship ore to the company's smelter.

PHILIPPINE ISLANDS.

MASBATE.

Cogran Mining & Development Association.—From the secretary of the company, George Lander, we have received the following details: The company has just completed its first year's work, consisting of prospecting and development. The extension of the vein has been proven by numerous crosscuts for a distance of 1,600 ft. A tunnel on the vein at the 600-ft. level, 164 ft. long, has been driven out of which has been taken 2,000 tons of $12 ore. A shaft at the face of the tunnel has been driven to the surface 60 ft. The vein is 18 ft. and assays from $5 to $75. The formation is granite on the hanging wall and serpentine foot-wall. On the foot-wall between the serpentine and silica there is an incrustation of silicate of copper which above the permanent water level carries native copper and black oxide of copper. This property is on the same river upon which the Risdon Iron Works are now putting in a dredge (about 4½ miles above). The vein extends south 62° east and the general course of the river is south 50° east. There are many promising prospects, both quartz and placer, in this district.

Foreign Mining News.

AFRICA.

RHODESIA.

The gold production in April is reported by the Chamber of Mines at 33,268 oz. bullion. For the four months ending April 30 the total was 130,857 oz. bullion against 73,671 oz. for the corresponding period in 1903, showing an increase of 57,186 oz., or 77.6%. The bullion reported this year was equal to 116,463 oz. fine gold, or $2,407,290 in value.

NATAL.

The coal production of the colony in February was 86,924 tons, an increase of 27,551 tons over February, 1904. The number of men employed at the mines was 5,741; of these 276 were white men, 3,238 negroes and 2,227 East Indian coolies. The coal exported was 1,473 tons, and 45,470 tons were sold to steamers in the port of Durban.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending May 27 were as follows, in tons: Granby, 12,080; Mother Lode, 3,808; Mountain Rose, 33; Emma, 99; Oro Denoro, 66; Skylark, 50; Last Chance, 30; total for week, 14,166; total for year to date, 378,204.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending May 27 were as follows, in tons: Le Roi, 1,875; Centre Star, 1,920; War Eagle, 1,320; Le Roi No. 2, 60; Jumbo, 100; Spitzee, 30. Total for the week, 5,305 tons, and for the year 139,504 tons.

EUROPE.

GREECE.

A British consular report gives the production of the mines of Laurium for 1904 as follows: Manganiferous iron ore, 128,458 tons; hematite iron ore, 150,773 tons; zinc ore, 18,957 tons. The output of partially worked products was: Matte and speiss, 2,300 tons; arsenical silver-lead matte, 2,010 tons; zinc-lead matte, 156 tons. The mining industry is rather depressed at present, owing to the irregularity of exchange.

Mining Stocks.

(See quotations on page 1126.)

New York. June 7.

The chief incident of the week was the issue of the long-expected statement of Amalgamated, upon which comment will be found on another page. The market response to this statement was not very encouraging, since the stock fell from $83½ to $81½, recovering only to $81⅝ at the close. The outside coppers were dealt in to some extent. British Columbia copper sold small fluctuations around $7½, closing at 7⅝, while Greene Consolidated advanced a little, closing at $24½. United Copper was dealt in, with but little change in price, closing at $24.

Greene Consolidated Gold was quite active, but the price was forced down from $5½ to $4⅞, rallying to $5.

The Comstock and Cripple Creek mining shares were quiet, and generally devoid of interest.

In the industrial stocks American Smelting & Refining sold at $110⅛ for the common, and $118⅞ for the preferred. United States Steel closed at $26⅝ for the common and $93¼ for the preferred stock, both showing a slight gain during the week.

Boston. June 6.

Outside of continued liquidation in Greene Consolidated and Amalgamated Copper, the mining-stock market has displayed a good tone the past week. The selling of the former is said to be due to the liquidation of a speculative account in New York. The declaration of the usual bi-monthly dividend of 40c. was announced Saturday. The present price for the stock, $23, nets over 10%. A surprise was sprung by the United States Mining Co. in the announcement that it has been decided to increase the capital 100,000 shares, making the total 600,000 shares. A meeting of stockholders is called for June 14 to take action on this issue. In the circular it is announced that this increase is for the purpose of increasing the efficiency of the company, especially in the refining and smelting business. The stock will be offered at par, $25, and will give funds for the erection of two refineries. The stock broke $2.87½ to $28 on the announcement, but rallied to $29.25 today. The company has extensive plans on hand and promises to be a big factor in the smelting business.

The drop of over $6 in Amalgamated this week to $78 is the direct result of the issue of the long-promised statement. It was sorely disappointing to the rank and file, and the only favorable thing remarked is that the officials saw fit to establish a precedent by issuing one at all.

There has been more or less agitation about changing the management of the Centennial mine, and as a result the stock rose $1.37½ to $20.37½, but is off again to $18.25. Those seeking control claim to have 30,000 shares without soliciting proxies. Allouez made a sharp advance to $23.25, closing 50c. below this, against $20.75 a week ago. The management is the same as in Centennial, and in some quarters the agitation of the latter is said to be a pretext to gain control of Allouez really, instead of Centennial. Copper Range stiffened $1 to $72, but is off to $69.50 in the general weakness of today. The directors have declared quarterly dividend No. 2 of $1 per share, payable July 1. The Champion made a record product for May with 1,095 tons of mineral.

Isle Royale has again shown queer antics, advancing $1.75 to $20.50, with subsequent loss. Mass is selling at $8.50@$8, with $1 assessment paid. Utah rose $1.62½ to $44.87½, but is off to $43.50 again. Mohawk fell $2.25 to $48.75, but is back to $50 again, and Osceola, after rising $2.50 to $94, fell back to $91.75. There is likelihood of a $1 assessment being called by the Victoria Copper Mining Co. in the near future, to provide working capital. In January, 1904, $1 per share was called. There is likelihood that the Newhouse Mines & Smelters (Cactus) will soon be listed on the Boston Stock Exchange. There are 600,000 shares, par $10, and the stock is quoted around $20.

San Francisco. June 1.

The week was broken by a holiday which made some difference in the trading. Business in the Comstocks was not active, and prices had rather a declining tendency. Ophir closed at $6.50; Consolidated California & Virginia, $1.65; Hale & Norcross, $1.60; Sierra Nevada, 37c. per share.

In the Tonopah stocks business was also a little slow, but prices were well maintained. Tonopah Midway closed at $1.55@$1.60; Bullfrog, $1; Jim Butler, 85c.; Goldfield, 50c. per share.

On the California exchange business in oil stocks was quiet, and principally in the low-priced stocks. Kern River sold at $10.75; Monte Cristo, 82c.; Home, 42c.; Arline, 35c. per share.

Coal Trade Review.

NEW YORK, June 8.

ANTHRACITE.

The hard-coal trade shows no new features. While not as active as it was during April and May, it still shows rather more than the volume of business usually expected at this time of the year. Anthracite shipments during May were, in round numbers, 6,005,000 tons, as compared with 5,278,041 tons in April, showing that the trade as a whole did not take full advantage of the April discount. Shipments during the five months were thus 24,872,787 tons, as compared with 23,528,412 tons in the same period of 1904. All-rail trade remains at its proportionately large volume. In fact, it is reported that the New York, New Haven & Hartford, finding that its policy of seeking all-rail consignments in preference to water shipments has embarrassed its traffic facilities, has decided to re-instate some of its receiving docks at New Haven and New London, with a view to allowing a larger proportion of its cargoes to arrive by water.

Prices f. o. b. New York harbor shipping ports during June will remain as follows: Domestic sizes, $4.45 for broken, and $4.70 for egg, stove and chestnut. Steam sizes remain at the same figures: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice, and $1,30@$1.35 for barley.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is in a fair condition, as most of the producers are receiving a sufficient number of orders to move all the coal that they are mining. The large accumulations at tidewater during the last two or three weeks have been absorbed without much effort and the same is true of the large arrivals at various ports in the far East. A few scattering contracts have been closed during the past week and this class of business may be expected to continue in constantly diminishing volume for the rest of the month. Prices remain about the same as they have been for the last few weeks; a fair grade of steam coal can be had at about $2.35@$2.40 f. o. b. Owing to the close scrutiny which the railroads are keeping over the arrivals at tidewater points, it seems improbable that such accumulations as have been seen recently can occur again, as the fear of an embargo, at the appearance of an undue accumulation, acts as a check on those producers who are inclined to overdo their shipping capacity.

Trade in the far East shows a fair demand with a good normal quantity going forward. Trade along the Sound seems to be taking a little more coal, as consumers, under pressure, are willing to accept a few shipments. New York harbor trade is not active, although it has absorbed a good quantity of coal during the last week. All-rail trade continues in good condition, the ordinary proportionally large tonnage being carried Transportation from mines to tide continues excellent and car supply is limited only by the promptness with which unloading is attended to at South Amboy.

Coastwise vessel market shows that large boats are plentiful and that medium-sized craft are in better supply. Current rates from Philadelphia are quoted as follows: To Boston, Salem and Portland, 65@70c.; to the Sound, 55@60c.; to Lynn, Newburyport and Gardner, 90c.; to Portsmouth, 70c.; to Saco, 90c.@$1 and towages; to Bath, 75 cents.

Birmingham. June 5.

All attention in the coal situation in Alabama is now being given to the approaching convention of the United Mine Workers of America, Alabama district No. 20. If rumors should be true and the union miners should decline to make a new contract with the commercial coal companies until the furnace companies deal with the union, the coal production is likely to be damaged. The commercial coal mines are producing a large amount of coal, every ton of which is in good demand. It is denied that any of this coal is being sold to the furnace companies. The latter still feel the effect of the strike, which began last July, despite the fact that a large amount of non-union labor has been brought to this district and has been placed at work in the mines. The commercial coal mines are filling contracts which were, to a great extent, handled by the furnace companies. In a conversation with an official of a large coal and iron company during the past week, the correspondent was informed that there are no intentions of dealing with the union miners looking to a settlement of differences.

Cleveland. June 6.

The lake fight over the rates on coal has ended by a victory for the shippers. The lake carrying charges have been reduced 5c. all around, making the rates 30c. to the head of the lakes and 40c. to Lake Michigan ports. The shippers, in order to offset the competition of the Indiana and Illinois mines, tried to put down both the lake and the rail rates. Failing to win with the railroads, they centered their pressure on the boat owners. The latter had agreed not to carry coal, but having turned all of their tonnage into the ore trade, found that there was a possibility of a break in the rates there, with the result that the coal fight had to be ended.

The demand for coal has not increased much. Upper lake consumers have not been buying much so far. The local consumers of run-of-mine steam coal are taking a good deal of it, but the production is so heavy that prices have sagged and 90@95c. at the mines is about the average price, while three-quarter lake coal is selling at $1.90 f. o. b. vessels, Lake Erie ports. There is still a good demand for slack with prices holding about steady at 60c. at the mines for Pennsylvania and 70c. at the mines for the Ohio product.

The coke situation is much easier. The best grades of Connellsville coke are now offered at $2.50 at the oven for 72-hour foundry product, while furnace coke is selling at $2 to $2.25 at the oven.

Chicago. June 5.

With the usual midsummer dullness ahead, and with no apparent solution of the labor troubles that have perplexed Chicago for many weeks, wholesale coal dealers see little that is promising in the prospects for trade in the near future. The teamsters' strike has been brought under control by the civic authorities, so that there is little violence and deliveries are being made with an approximation to former regularity. Nevertheless, the public mind is impressed with the belief that it is dangerous to buy any commodity that has been interfered with in the strike, and this impression doubtless will continue to the end of the clash between employers and employed. It will curtail not only city trade but also country trade that is apprehensive about any part of its supplies being stopped or delayed.

In the last week trade generally has been very dull. Western bituminous, the coal handled most in the city, has been lifeless; no activity is manifest anywhere except in the fine coals branch of the trade. It would not be surprising, in the light of the experience of the last six months, if fine coals became the chief part of the Western bituminous business. Screenings continue to bring $1.30@$1.60, with the tendency of prices to remain firm if not to go upward.

Run-of-mine and lump from Illinois and Indiana mines can hardly be disposed of, under present conditions, and shipments have been greatly curtailed. It is asserted that the mines of these two States are not working more than two days a week, on the average. Contract business this year has fallen far below the average, and probably there will not be a legitimate demand for more coal than can be supplied under present conditions, before next October or November. The demand for fine coals largely comes about through the introduction and increase in number of mechanical-feed devices for boilers. This change seems likely to be permanent. Eastern coals are quiet and the market for home is demoralized, owing to a wise restriction of shipments. All selling agents are making preparations for the continuance of light sales throughout the summer. Smokeless brings $2.90@$3.15, according to list prices, which are fairly well adhered to; Hocking brings $2.90 for lump and $2.25 for run-of-mine, and Youghiogheny $2.90@$3.

Anthracite is in light demand, all agents reporting that the bulk of the business apparently will not be handled this year, as last year, before the beginning of autumn weather at shortest.

Pittsburg. June 6.

Coal.—The mines in the district, both river and rail, are in operation, and prospects are regarded as very bright. Prices, however, are about the same, and are on a basis of $1@$1.10 for run-of-mine at the mine. Some important deals in coal lands have just been closed. The Jones & Laughlin Steel Co. has bought 9,600 acres, increasing its holdings to 15,000 acres. The Pittsburg-Buffalo Co. has added 3,104 acres, and now owns about 20,000 acres in the thick-vein fields adjoining the property of the Jones & Laughlin Steel Co. In the same field the Monongahela River Consolidated Coal & Coke Co. and the Pittsburg Coal Co. own 18,000 acres, and the J. W. Ellsworth Co., 12,000 acres. The most valuable land in the thick-vein district is now being held by these large concerns, some of it being acquired at an average price of $333 an acre. What is left on the market is being held at prices ranging at from $500 to $1,500 an acre.

Connellsville Coke.—Production and shipments continue to decline, and prices are a trifle weaker. Furnace coke continues to be quoted at $1.80@$1.90, but foundry coke is down to $2.40@$2.60. The production for the week is given at 255,416 tons, and the shipments aggregated 11,959 cars, distributed as follows: To Pittsburg and river points, 4,620 cars; to points west of Pittsburg, 6,158 cars; to points east of Everson, 1,181 cars. This was a decrease of 65 cars.

San Francisco. June 1.

Trade continues quiet, with only a small demand for domestic coal, which is to be expected at this season. Steam coal is steady, and fuel oil in good demand. No change in prices.

For Coast coals, in large lots to dealers, prices are as follows: Wellington, New Wellington and Richmond, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; White Ash, $5.25. For Rocky Mountain coals, in car lots, quotations are: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are nominal at $14 for Pennsylvania anthracite, and $13 for Cumberland. For foreign coal quotations are, ex-ship: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

June 7.

Exports of coal and coke from the United States for the four months ending April 30 are reported by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904.	1905.	Changes.
Anthracite	483,980	578,015	I. 94,035
Bituminous	1,555,053	1,803,327	I. 248,274
Total coal	2,039,033	2,381,342	I. 342,309
Coke	163,397	190,303	I. 26,906
Total	2,202,430	2,571,645	I. 369,215

The coke went chiefly to Mexico, with some shipped to Canada also; the latter being taken by blast furnaces in Ontario. The coal exports were distributed as follows:

	1904.	1905.	Changes.
Canada	1,268,784	1,572,253	I. 303,269
Mexico	364,498	339,546	D. 24,952
Cuba	166,846	185,244	I. 18,398
Other West Indies	89,223	116,173	I. 26,950
France	5,309	405	D. 4,904
Italy	19,490	20,034	I. 544
Other Europe	14,851	6,711	D. 8,140
Other countries	109,832	140,976	I. 31,144
Total	2,039,033	2,381,342	I. 342,309

Naturally, our chief customers are the adjacent countries—Canada, Mexico, Cuba and the other West Indies. The coal to other countries goes principally to South America. Exports to Canada in detail were as follows:

	1904.	1905.	Changes.
Anthracite	471,844	562,160	I. 90,316
Bituminous	797,140	1,010,093	I. 212,953
Total	1,268,984	1,572,253	I. 303,269

The increase in anthracite was 19.1%, and in bituminous, 26.7%; making a gain of 23.9% in the total exports.

Imports of coal into the United States for the four months ending April 30 are reported by the Bureau as follows:

	1904.	1905.	Changes.
Canada	470,597	443,661	D. 26,936
Great Britain	34,737	20,366	D. 14,371
Other Europe	50	113	I. 63
Japan	18,384	16,251	D. 2,133
Australia	73,614	35,611	D. 38,003
Other countries	977	158	D. 813
Total	598,359	516,160	D. 82,199

Of the coal imported this year, 2,985 tons were classed as anthracite; the balance was bituminous. With the exception of some Nova Scotia coal which comes to Boston, the imports from Canada were British Columbia coal, received at California ports. There was a large decrease this year in Australian coal, which comes to California. Nearly all the Japanese coal is received at Manila.

Iron Trade Review.

NEW YORK, June 7.

The iron trade shows little change from last week's condition. The pig-iron market is dull, and prices are generally weak. Production is rather declining, several furnaces having been blown out. Moreover, it is understood that the United States Steel Corporation will buy no outside iron this month.

In finished material matters are better. There is an improvement in some lines, and orders are coming in, especially for plates and structural material. The railroad orders for equipment are heavy, and a great deal of material is being taken on this account, as well as for bridge work. Rail business is showing some improvement, and there is more inquiry for trolley rails.

Some comments on the iron situation will be found on another page.

Exports and Imports.—Exports of iron and steel, including machinery, from the United States, for April and the four months ending April 30, are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904.	1905.	Changes.
April	$10,588,051	$13,076,975	I. $2,488,924
Four months	38,153,812	43,660,888	I. 5,507,076

The increase for April was 23.4%; for the four months it was 14.4%. The April export trade reached the highest figure of any month this year. The chief items of export were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	17,023	25,221	I. 8,198
Billets and blooms	110,489	70,016	D. 40,473
Bars	17,418	22,142	I. 4,724
Rails	42,458	91,877	I. 49,419
Sheets and plates	8,461	18,746	I. 10,285
Structural steel	10,962	27,259	I. 16,297
Nails and spikes	13,749	15,264	I. 1,515
Wire	38,519	40,247	I. 1,728

The only item showing a decrease was billets, ingots and blooms. The most marked gains were in rails and structural steel. The heavy exports of rails have been to Mexico, South America and Eastern Asia. Exports of iron ore were 275 tons in 1904, and 3,055 tons in 1905; an increase of 2,780 tons.

The imports of iron and steel into the United States for the month of April and the four months ending April 30 are valued as follows:

	1904.	1905.	Changes.
April	$1,735,648	$2,114,204	I. $378,556
Four months	7,181,441	7,857,984	I. 676,543

The increase of April was 21.8%; for the four months, it was 9.4%. The leading items of these imports were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	34,766	51,840	I. 17,074
Billets, blooms, etc	5,434	6,163	I. 729
Scrap iron and steel	5,790	5,182	D. 608
Bars	5,979	9,892	I. 3,913
Rails	14,721	1,267	D. 13,454
Wire-rods	5,341	5,098	D. 243
Tin plates	21,679	25,383	I. 3,704

The most notable increase was in tin plates. The only large proportionate decrease was in rails. The imports of iron ore were 117,403 tons in 1904, and 268,712 tons in 1905; an increase of 151,300 tons. In addition to Cuban ore, there have been considerable imports of Spanish ore this year. Imports of manganese ore were 1,995 tons in 1904, and 54,776 tons in 1905; showing the extraordinary gain of 52,781 tons this year.

Birmingham. June 5.

There is a little better feeling in the pig-iron market in the Southern territory, but it cannot be claimed that conditions are yet satisfactory. Iron quotations have not changed. The furnacemen are not disturbing the healthy production of iron, and though there is a little accumulation of the product, there appears to be no apprehension. A better inquiry for iron is being enjoyed, and some sales are being made. More than one of the higher officials of the furnace companies in this district stated during the past week that there was some improvement in the market, though quotations remain under $13.25. The Sloss-Sheffield Steel & Iron

Co. has accumulated perhaps the largest amount of iron, inasmuch as it is manufacturing the largest amount of foundry iron in this territory. The Tennessee Coal, Iron & Railroad Co. is manufacturing basic iron exclusively at Ensley furnace for use in the steel plant at that point. The production in the territory is still large.

It is learned that sales being made now in the Southern territory stipulate immediate delivery almost. The lots are not in great quantity, indicating that purchasers are proceeding cautiously. Reports were current recently that some of the larger consumers, cast-iron pipe manufacturers and others, had secured contracts which would require them to enter the market again for raw material. Southern irons are being shipped in various directions. The local consumption is heavy, cast-iron pipe foundries and other institutions requiring no mean quantity of the product.

The following quotations are given: No. 1 foundry, $13.50; No. 2 foundry, $13; No. 3 foundry, $12.50; No. 4 foundry, $12; gray forge, $11.25@$11.50; No. 1 soft, $13.50; No. 2 soft, $13.

There is nothing new to be said of the steel production in Alabama. The two steel plants, one at Ensley and the other at Gadsden, are in full operation. The Tennessee Co. has orders on hand for the probable make in rail this year.

The foundry trade is holding up nicely. There is a little scarcity of labor reported at the furnaces, foundries and mills. The Gate City rolling mills (Republic Iron & Steel Co.) continue in steady operation. The demand for bar iron is not so brisk. It is announced that the Sheffield rolling mills will shortly start in to manufacture cotton ties. The Bessemer mill (Tennessee Co.) is still working steel. The old plant of the Southern Car & Foundry Co. at Gadsden will be used hereafter as repair shops for the Alabama Great Southern Railroad.

BY TELEGRAPH.

BIRMINGHAM, ALA., June 6.—No. 2 foundry iron is now quoted at $12.50 per ton, a reduction of 50c. from recent prices. Furnacemen report an immediate improvement in demand, shown by numerous inquiries received.

Chicago. June 5.

Actual buying of pig iron continues very light, but inquiries have been more numerous in the last week, and there is a hopeful feeling on the part of selling agents due to this fact. The consumer will not engage his iron ahead, as he normally does, and as he has done in the last two or three months. In this condition there is nothing for the seller to do but to wait until the feeling changes or conditions force large buying. The psychological explanation is the chief, if not the only, explanation of conditions, as local dealers see them. Buying is becoming more and more confined to small lots that will barely supply the foundryman for immediate needs. A similar condition in the summer of 1904 was followed by a rush to buy in October, and the trade may be in for a series of such occurrences. It seems certain that the consuming power of the country has not fallen behind to any great extent; sales of manufactured iron are good in almost every line, and there are no prospects of a marked change.

A revival of sales of pig iron in the local market would be an unusual thing in the next three months, for the summer is almost invariably a period of dullness. The most the trade can reasonably look for is to hold its own, in the hope that the autumn will see a sharp revival.

There is no notable change in prices, both Northern and Southern being off fully 50c. from the established prices of $17.50 for Northern and $13.50 Birmingham or $17.15 Chicago for Southern. How much more prices are off is not generally known, but some sales probably are being made at least 25c. lower, or 75c. off list prices. Northern seems to have something of the advantage in the present market, though that is saying but little.

Coke is quiet, shipments being so restricted as not to cause demurrage, and sales rather light, the price being unchanged.

Cleveland. June 6.

Iron Ore.—The movement for May down the lakes was 4,200,000 tons. It was so heavy that boats, which have been engaging in this trade exclusively, have gone into the coal trade to keep from breaking the ore carrying charges. There is every indication that boat capacity will be ample to carry in June as large a movement as in May, even with much of the tonnage turned into other channels. The rates hold at 75c. from the head of the lakes; 70c. from Marquette and 60c. from Escanaba.

Pig Iron.—The market has been about as dull as at any time during the past two years. Buyers have been backward and furnaces not having business booked after July 1 want to get buying started, even if it becomes necessary to make a sacrifice in the matter of the price. So far, the buying of small lots has been done at $15.50 in the Valleys for No. 2, although that is hardly indicative of what might be done on good orders. The basic and bessemer trades are quiet in the extreme. Southern foundry producers are offering material here at $12.50 to $13 Birmingham for No. 2.

Finished Material.—The market has been better in most respects. Shipbuilding people have been heavy buyers, and there is an enormous tonnage in sight for the near future. There is good business in sight also from the building trade of Cleveland, which is showing something approaching boom proportions. The price holds at 1.60c. Pittsburg. Bar iron is dull, due to the number of new mills operating, the competition of Western producers and the slackness of buying. The price has eased to 1.50c. at the mill. The sheet trade is a little better than it has been, but the small mills are still cutting prices to get business. Several new traction deals in this territory will increase the demand for steel rails in the near future. At present the buying is light. The billet trade is strong, with forging quality in best demand at premium prices. Old material is extremely weak.

New York. June 7.

Pig Iron.—The iron market continues quiet, and almost the only new orders that can be chronicled are small quantities for short deliveries. The cast-iron pipemakers are, however, taking considerable material. The generally lower range of prices has been established all around, but has hardly had much effect on the market as yet. The difference varies from 25c. to 50c. per ton.

For Northern iron we quote: No. 1X foundry, $16.75@$17.25; No 2X, $16.25@$16.75; No. 2 plain, $16@$16.25; gray forge, $14.50@$15. Virginia foundry is held pretty firmly at $17.15@$17.65. Southern iron has been quoted about the same as last week, but a dispatch just received from Birmingham says that the companies are now selling on a basis of $13 for No. 2 foundry. This will doubtless have its effect on our market in a day or two, and may improve demand.

The warrant market on the Produce Exchange remains quiet as usual. Latest quotations are $14 bid and $14.75 asked, June and July delivery, for regular warrants, and $15 bid and $15.75 asked for foundry warrants June and July delivery.

Bars.—Bar iron continues in moderate demand. Quotations are unchanged at 1.595@1.645c. large lots on docks. Steel bars are held at 1.645c. Store trade continues pretty steady, with quotations 1.75@2c., delivered.

Plates.—Plates in small orders are in fair demand, and buyers who ask for concessions are not getting them. Tank plates are 1.745@1.795c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.645c. up, according to width.

Structural Material.—Business in small lots continues good and some large contracts are pending. Prices remain unchanged. Beams under 15 in. are 1.745c. for large lots; over 15 in., 1.845c.; angles are 1.745c. tidewater.

Steel Rails.—Standard sections continue $28 per ton at mill, but hardly any business is done in the market. Girder and trolley rails are more active. Light rails are quiet, prices ranging from $24 for 12-lb., up to $21 for 35-lb. rails.

Old Material.—The market is dull, and dealers are inclined to take lower offers. No. 1 railroad wrought can be had for

$17.50@$18; yard wrought, $15@$15.50; machinery cast, $13.25@$13.75. Heavy steel melting scrap is in better demand at $14.50@$15. These prices are on cars, Jersey City, or other terminal delivery.

Philadelphia. June 7.

Pig Iron.—The past few days have shown a general backwardness among customers of pig iron, though there has been no break in prices, and our makers say that, no matter how things go, any reduction of prices is a most remote possibility. All of the furnaces have contracts on hand that call for deliveries as late as September. Quotations are just as given last week, and there are no offers from buyers.

Bars.—Our bar mills are still booking some business, enough to make the managers feel that there will be a busy summer. There is no weakness shown in prices.

Sheets.—There is no change in the situation, the mills have enough work for some weeks to come, and it appears that a good deal of galvanized iron will be contracted for late in this month.

Pipes and Tubes.—The tube situation is most gratifying and business is good, prices are firm, and there is sufficient inquiry to assure continued activity at the mills. Merchant tubes are also in active demand, and capacity is well sold up.

Plates.—The plate situation is strong, and a great deal of material is still being contracted for. All the mills are crowded with work, and small buyers are still obliged to pay premiums for accommodation.

Structural Material.—The structural situation has not changed, and demand for small lots for building is now stronger than two weeks ago. A great deal of office and warehouse building is under way in this territory.

Steel Rails.—There are inquiries to-day for rails for electric lines, but the quantities that may be wanted are not stated. There is a great deal of electric road construction under negotiation.

Old Rails.—Old iron rails are held at $21 in this market.

Scrap.—Steel scrap is held at $16; railroad scrap at $19; No. 1 yard scrap, $17; machinery scrap at $15.50; No. 1 forge fire scrap at $15.50. Other kinds are very weak, as there is no demand.

Pittsburg. June 6.

There is a decided dullness in the pig-iron market and prices are weaker than at any time this year. Instead of buying outside iron, as was expected, the United States Steel Corporation has closed some more blast furnaces, one at Braddock and one in the Wheeling district, and a few more may be put out of blast soon for repairs and relining. While production of pig iron is being greatly curtailed, there does not appear to be any decrease in consumption. The production of pig iron at the opening of the month of May, including the charcoal stacks, was at the rate of 24,000,000 tons annually. A number, however, were blown out during the month, and at the beginning of June the rate of production was about 22,500,000 tons. The merchant furnaces in the valleys have, since the first of May, piled about 50,000 of bessemer pig iron.

Despite the lull in pig-iron buying there is an improvement in some lines of finished steel products, and every branch of the industry appears to be in excellent shape, with possibly the exception of sheets and tin plate. The Republic Iron & Steel Co. has just booked a contract for 20,000 tons of steel rails at the pool price of $28 a ton. It will begin to roll rails at its new mill on July 1. This company is not a member of the rail pool, but is not antagonistic to it. According to the latest estimates, orders have been placed for rails for this year's delivery aggregating 1,700,000 tons, and the 2,000,000-ton mark is expected to be reached shortly. Reports of a dissolution of the rail pool have given way to rumors of an abandonment of the billet pool. A dispatch from New York yesterday says a meeting of the billet pool will be held there on Wednesday. It was learned, however, that this report is erroneous and there will be no meeting. Billets are still selling at a higher price than fixed by the pool, and there is no reason for a dissolution, or an open market. Prices have eased off somewhat, and bessemer billets can be had for early delivery at a shade above the pool price of $21 a ton, but it is impossible to buy open-hearth billets at less than $22 or $22.50. Sheet-bars are held firmly at $24, which is $1 above the price established by the so-called pool. The improvement in wire and merchant pipe noted last week continues, although this is regarded as a dull period for those lines. The outlook for structural material and plates could not be better, and the mills will be operated steadily through the year. It is estimated today that the American Bridge Co. has contracts on its books that will require fully 450,000 tons of structural material, and all the independent concerns are crowded with business. There are more orders for steel cars than can be filled this year by the car companies, and the steel plates needed will keep the plate mills going continuously all year. In addition to the orders already booked, some large inquiries are being received for plates and structural material. One or two large contracts are reported to have been closed by the Japanese government for steel cars and shapes, but official information is not given. The Pressed Steel Car Co. is said to have taken an order for 1,800 steel cars, to be shipped to Japan at an early date, but the company for some reason declines to either confirm or deny the report. The Jones & Laughlin Steel Co. is making some extensive improvements and enlarging its plant on the South Side in anticipation of a heavy fall trade. Several representative steel manufacturers, in talking on the situation and outlook today, declared that trade is excellent and prospects could not be much brighter. They agree that discouraging reports of the steel market emanate from Wall street and are entirely unwarranted. While it is generally conceded that the weak lines are sheets and tin plate, this is not admitted by the leading producers. A representative of the American Sheet & Tin Plate Co. said that, although trade is usually dull in the summer months, there are more orders on the books for third-quarter delivery than last year. The American company operated last week 85% of its tin-plate and 83% of its sheet mills. To-day 36 of its 242 tin-plate mills are idle, and on June 17 this number will be increased to 81, which will leave 66% in operation. All of the mills closed and slated for a shut-down are union mills. It is believed the production of sheets will be correspondingly decreased. This is believed to indicate that the American Co. contemplates a fight against the Amalgamated Association of Iron, Steel & Tin Workers, and that it will succeed in non-unionizing all of its plants. No date has been fixed for a conference with the association, but one likely will be held when the conference on the iron scale, which opened at Detroit yesterday with the Republic Iron & Steel Co., is ended. The radical element seems to be in control of the Amalgamated Association, and it would not be surprising if a fight occurred between the organization and the Republic company.

Pig Iron.—No sales of any consequence were made during the week and prices have declined. Bessemer pig iron is quoted at $15@$15.50, Valley furnaces; foundry No. 2 at $16.35@$16.60, Pittsburg, and gray forge at $15.35@$15.60, Pittsburg.

Steel.—It is now possible to buy bessemer billets at the pool price of $21, but open-hearth billets are held at $22@$22.50. Sheet-bars command a premium of $1 above the pool price of $23. Plates remain at 1.60c. and steel bars at 1.50c.

Sheets.—The established prices of 2.40c. for black and 3.45c. for galvanized sheets No. 38 gauge are still being shaded and the market is not in very good shape. Labor troubles are expected to occur when the present wage agreement with the Amalgamated Association expires on June 30, which may result in stiffening prices.

Ferro-Manganese.—There is no change in the market, domestic 80% still being quoted at $49@$50 a ton.

Cartagena, Spain. May 20.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were one cargo, 2,300 tons manganiferous ore and one cargo, 2,950 tons dry ore, to Great Britain; one cargo,

2,100 tons of manganiferous and two cargoes, 8,600 tons magnetic ore, to Rotterdam; one cargo, 1,600 tons manganiferous ore, to Stettin. The market continues strong and there is no surplus stock for shipment.

Quotations for ordinary 50% ore are 6s. 3d.@6s. 6d.; special low phosphorus 6s. 10d.@7s. 6d.; specular ore, 58%, 9s. 6d. All quotations are f. o. b. shipping port. Manganiferous ore varies from 9s. 6d. for 35% iron and 12% manganese to 14s. 6 d. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are held at 10s. per ton. No shipments reported for the week.

Chemicals and Minerals.

New York. June 7.

Trade remains quiet, with prices firm.

Copper Sulphate.—The decline in the price of copper has lowered the price from $5 to $4.80 per 100 pounds.

Acids.—The market remains strong.

Nitric acid, 36°, 100 lb	$5.00
38°, 100 lb	5.25
40°, 100 lb	5.50
42°, 100 lb	5.75
Oxalic acid, com'l, 100 lb	$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb. in carboys	1.05
60°, bulk, ton	18 00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk, ton	21.00@23.00

Sulphur and Pyrite.—Domestic prime sulphur is quoted at $21 in New York; in Baltimore $21.25 ex-vessel and $21.50 ex-store; in Philadelphia, $21.25; in Portland, Me., $21.10 ex-vessel, and $21.25 ex-store; in Boston $21.10. Pyrite is quoted at 10@11 per unit of sulphur for lump ore, and 8.5@10.5 for fines f. o. b. Atlantic ports.

Nitrate of Soda.—Spot is quoted at $2.40 for 96%, and $2.35 for 95%. Contracts can be fixed due monthly, July to December inclusive, at $2.27½ for 96% and $2.22½ for 95%; monthly from December inclusive, 1906, for $2.17½ for 96%, and $2.12½ for 95 per cent.

Messrs. Mortimer & Wisner's monthly statement of nitrate of soda, dated June 1, gives the following statistics, in long tons:

	1904	1905
Imported into Atlantic ports from West Coast S. A. from January 1, 1905, to date.	109,114	98,700
Stock in store and afloat June 1, 1905, in New York	3,970	100
Stock in store and afloat June 1, 1905, in Philadelphia	5,000	.....
Stock in store and afloat June 1, 1905, in Baltimore	900	5,000
To arrive, due September 15, 1905,	62,550	95,700
Visible supply to September 15th,	72,420	100,800
Stock on hand January 1, 1905	8,100	8,380
Deliveries past month	11,230	16,100
Deliveries since January 1 to date,	107,334	101,980
Total yearly deliveries	239,684	.....
Prices current June 1, 1905	2.20c	2.35c

Quotations are for 96%, 95% can be had at from 2½c. to 5c. per 100 lb. cheaper.

Sulphate of Ammonia.—Gas liquor is quoted at $3.10@$3.15 per 100 lb., with sellers at a shade less, if any important business can be found.

Phosphates.—The market is firm, and shows a healthy condition. The Australian and Japanese demand is likely to take the supply of Pacific island phosphate for the coming year, thereby lessening their competition with Florida rock in the European markets.

Phosphates.	F. o. b.	C. I. F. Gt. Britian or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.35@4.40	10.27@10.67
78%	3.75@4.00	.....
75%	3.40@3.50	.....
68@72%	3.00@3.25	.....
‡So. Car. land rock	3.75@4.00	.....
river rock	3.50@3.75	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr	.....	11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Liverpool. May 31.

Messrs. Joseph P. Brunner & Co. report that the market for heavy chemicals is steady as regards prices, but export trade lacks animation.

Soda ash is in steady demand at usual range as to destination, and for tierces nearest range may be called about as follows: Leblanc ash, 48%, £5 to £5 10s.; 58%, £5 10s. to £6 per ton; ammonia ash, 48%, £4 5s. to £4 10s.; 58%, £4 10s. to £4 15s. per ton, net cash; bags, 5s. per ton under price for tierces.

Soda crystals are in request at generally £3 7s. 6d. per ton, less 5% for barrels or 7s. less for bags; with special terms for a few favored markets.

Caustic soda is in demand for high strengths, which are in limited supply at the moment, but in the lower strengths trade is not active. Quotations are firm, as follows: 60%, £8 15s.; 70%, £9 15s.; 74%, £10s. 5s.; 76%, £10s. 10s. per ton, net cash. Special quotations for export to the Continent and a few other export quarters.

Bleaching powder is rather slow, but prices are unchanged, varying from £4 10s. to £4 15s. per ton, net cash, for hardwood, as to market.

Chlorate of potash is maintained at 3 1-16d. to 3 3-16d. per lb., net cash, as to quantity and market.

Bicarbonate of soda is in steady request at £6 15s. per ton, less 2½%, for the finest quality in 1 cwt. kegs; with usual allowances for larger packages; also special terms for a few favored markets.

Sulphate of ammonia receives a fair amount of attention from buyers, and is quoted at £13 to £13 2s. 6d. per ton, less 2½%, for good gray 24-25% in double bags, f. o. b. here.

Nitrate of soda continues in request and £11 2s. 6d. per ton for ordinary, up to £11 7s. 6d. per ton for refined, for double bags f. o. b. here, less 2½%, represent nearest spot values.

Metal Market.

New York, June 7.

Gold and Silver Exports and Imports.

At all United States Ports in April and Year.

Metal.	April.		Year.	
	1904.	1905.	1904.	1905.
G'ld Exp	$19,470,157	$1,303,874	$23,857,796	$35,319,128
Imp	10,289,869	2,581,057	32,404,911	11,803,259
Exc	E. $9,180,288	I. $1,277,183	I. $8,547,115	E. 23,515,879
Silv. Exp	3,832,758	2,317,599	16,859,052	14,930,051
Imp	2,115,436	2,559,858	9,039,839	9,075,314
Exc	F. $1,617,322	I. $242,259	E. $7,819,213	E. $5,854,837

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending June 3, and for years from January 1.

Period.	Gold.		Silver	
	Exports.	Imports.	Exports.	Imports.
Week	.....	$37,680	$648,280	$139,342
1905	32,990,546	5,169,142	13,493,018	1,654,482
1904	63,497,805	2,765,769	18,080,181	360,363
1903	8,495,823	2,948,928	7,709,560	938,939

Exports of silver were chiefly to London. Imports of both gold and silver were from the West Indies and South America.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending May 20 gives the following totals, comparison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discount	$1,036.565,200	$1 101,283,100
Deposits	1,098,798,900	1,136,477,700
Circulation	37,282,000	46 273,000
Specie	226 623,400	204,546,500
Legal tenders	79,837,200	85,623,200
Total reserve	$306,406,600	$290,169,700
Legal requirements	274,699,275	284.119.425
Balance surplus	$31,760,875	$6,050,275

Changes for the week this year were decreases of $9,720,300 in loans, $10,076,300 in specie, $2,100 in legal tenders, $18,654,500 in deposits and $5,415,525 in surplus reserve; an increase of $437,300 in circulation.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York	$204,546,500	.....
England	189,332,030	.....
France	573,227,790	$221,742,410
Germany	210,595,000	70,200,000
Spain	74,000,000	110,005,000
Netherlands	33,774,000	31,491,500
Belgium	15 760,000	7,880 000
Italy	112.025.000	18.074,000
Russia	523.325 000	32,455,000
Austria	240,175,000	65,940,000

The returns of the Associated Banks of New York are of date June 3 and the others June 1, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has closed today with considerable inquiry. Since the Mexican monetary reform law has gone into operation, more bullion has been thrown upon the market, which generally was coined

into dollars. This, at times, has an effect upon the price, and checks an advance.

The United States Assay Office in New York reports receipts of 154,000 oz. of silver for the week.

Shipments of silver from London to the East for the year up to May 25 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India	£4,702,803	£2,873,271	D. £1,829,532
China	126,062	471,770	I. 345,708
Straits	58,103	2,800	D. 55,303
Totals	£4,886,968	£3,347,841	D. £1,539,127

Shipments for the week were £2,500 to Madras, £30,000 to Calcutta, and £62,500 to Shanghai; total, £95,000. Receipts were £147,000 from New York, £4,000 from Chile, and £2,000 from Australia; total, £153,000, all bar silver.

Indian exchange has been steady, though the demand for money is light. The Council bills offered in London, 30 lakhs, were taken at an average of 15.96d. per rupee. Buying of silver for India has been light; but a large amount was taken for China, and a further amount, said to be for Russia, was taken.

The movement of gold in France for the three months ending March 31 is reported by the Ministry of Commerce as follows:

	1904.	1905.
Imports	Fr. 61,856,500	Fr. 229,404,000
Exports	26,068,000	25,360,000
Excess, imports	35,788,000	224,044,000

There was a large increase in the imports. The movement of silver for the three months was as follows:

	1904.	1905.
Imports	Fr. 27,893,000	Fr. 17,322,000
Exports	29,221,000	21,223,000
Excess, exports	1,328,000	3,901,000

Imports of nickel and copper coins, rated at their par value, were 22,000 fr. in 1904, and 50,000 fr. in 1905; exports of these coins were 138,000 fr. in 1904, and 76,000 fr. this year.

Other Metals.

Daily Prices of Metals in New York.

June	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Tin, Cts. per lb.	Lead. Lead, Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
1	14⅜ @14⅝	14⅛ @14⅜	65⅜	30 @30⅛	4.50	5.15	5.00
2	14⅜ @14⅝	14⅛ @14⅜	65⅜	30 @30⅛	4.50	5.15	5.00
3	14⅜ @14⅝	14⅛ @14⅜	....	30 @30⅛	4.50	5.15	5.00
5	14⅜ @14⅝	14⅛ @14⅜	66⅛	30 @30⅛	4.50	5.15	5.00
6	14⅜ @14⅝	14⅛ @14⅜	66	30 @30⅛	4.50	5.15	5.00
7	14⅜ @14⅝	14⅛ @14⅜	65⅞	29⅞ @30⅛	4.50	5.15	5.00

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. Cathodes are usually 0.25c. below that of electrolytic copper.

SILVER AND STERLING EXCHANGE.

June.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.	June.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
1	4.87	57¾	26 9/16	5	4.8695	58¼	26 11/32
2	4.8690	57⅞	26 9/16	6	4.86⅞	58¼	26 11/32
3	4.8690	57⅞	26 9/16	7	4.8695	58⅜	26⅜

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine

Copper.—A buying movement of considerable volume developed during the past week, and at one time it looked as though the market would broaden materially. A more quiet feeling, however, prevails at the end of the week, as buyers seem to have satisfied their wants. The closing prices are 14¾@14⅞ for lake; 14⅝@14¾ for electrolytic in cakes, wirebars or ingots; 14⅜@14½ for cathodes and 14¼@14⅜ for casting copper.

The standard market experienced a spurt during the week, at one time covering £66, but it is now easy at £65 7s. 6d. for prompt and three months.

Statistics for the second half of May show an increase of 300 tons. Refined and manufactured sorts we quote: English, tough, £68 10s.@£69; best selected, £69@£69 10s.; strong sheets, £78; India sheets, £74; yellow metal, 6⅜d.

Exports of copper from New York and Baltimore for the week ending June 3 were 3,264 long tons. Imports included 104 tons of copper, and copper ore valued at $1,419 in all.

Tin.—The movement in prices has been exceedingly narrow, the market, however, holding steady, owing to the fact that consumers are not supplied and are buyers right along. The quotations at the close are 29⅞@30⅛, depending upon the delivery.

The situation here is a reflection of the London market, which closes steady at £136 7s. 6d. for spot and £135 2s. 6d for three months.

Statistics for the month of May have increased 13 tons.

Lead.—The market is steady, without any new feature, and quotations are unchanged at 4.42½ St. Louis and 4.50 New York.

The London market shows considerable firmness and an active demand has developed, the closing prices being £12 18s. 9d. for Spanish and £13 1s. 3d. for English.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of May 20, that the local lead market is harder. Silver is 14 reales per oz. Pig lead has been 69.25 reales per quintal, which, on current exchange—33.13 pesetas to £1—is equal to £11 14s. 8d. per long ton, f. o. b. Cartagena. Shipments for the week were 309 tons argentiferous and 198 tons desilverized to Marseilles; 810 tons desilverized lead to London.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is firmer on account of a better demand. Missouri brands and desilverized are both selling at 4.42½c. East St. Louis, with none to be had for less.

Spelter.—The market has shown very little resistance to a continued pressure to sell, and as the dull season is approaching, not much activity is expected. Quotations at the close are somewhat lower at 5c. St. Louis and 5.15 New York.

The London market has been steady and closes at £23 15s. for good ordinaries and £24 for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is reasonably steady at the late decline. Yesterday the metal sold at 5.05c., and to-day 5.07½c. is bid, and the quantity obtainable at this price is limited.

Silesian Spelter Market.—Herr Paul Speier writes from Breslau, Germany, that the market remains about as last month, quotations for ordinary brands being 24 marks per 50 kg., f. o. b. cars, Breslau. This is equal to 5.18c. per lb. Prices for zinc-dust are unchanged. Exports and imports of spelter in Germany for the four months ending April 30 were, in metric tons:

	1904.	1905.	Changes.
Spelter	21,386	19,915	D. 1,471
Zinc sheets, etc	5,364	5,284	D. 80
Total exports	26,750	25,199	D. 1,551
Imports	6,074	7,693	I. 1,619
Net exports	20,676	17,506	D. 3,170

Exports of zinc white were 5,245 tons this year, while imports were 2,012 tons. Imports of zinc ore were 41,763 tons; exports being 12,859 tons. The exports were chiefly to Belgium.

Antimony.—There has been a great deal of excitement in the antimony market, particularly abroad, where requirements have been exceedingly heavy for war purposes. The price has gone up by leaps and bounds, closing at 10½@11½c., depending upon the brand.

Nickel.—The large producers quote nickel at 40@47c. per lb., for lots of one ton or over, according to size and conditions of order. For small quantities as high as 60c. is named.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. each for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated ware, 90c., and cones, $1 per gram.

Quicksilver.—Quicksilver is unchanged, $38@$39 per flask—75 lb.—being asked for large orders. For small quantities, $40 is paid. San Francisco prices are $38 for domestic orders, and $36.50@$37 for export. The London price is easy at £7 7s. 6d. per flask, from both first hands and jobbers.

Cadmium.—Metallic cadmium, guaranteed 99.5%, in lots of 100 kg. or over, brings 7.10 marks per kg., net cash, f.o.b Hamburg, in shipping packages. This is equal to 76.65c. per pound.

Thallium.—Thallium is quoted at 60@65 marks per kg.—equal to 64.8@70c. per lb. —at Breslau, Germany.

Manganese Alloys.—Prices for manganese alloys in Germany are given by Herr Paul Speier as below. The prices are for orders of not less than 500 kg., delivered in Bremen, and are as follows, per 100 kg.: Manganese copper, No. 1, guaranteed 30% manganese, 265 marks; No. 2, 28 to 30% manganese, for bronze, etc., 175 marks; No. 3, 25 to 20% manganese, with 2 to 4% iron, 165 marks. Manganese tin, No. 1, free of iron and guaranteed 55% manganese, 365 marks; No. 2, 55% manganese, with some iron, 225 marks. Manganese nickel, No. 1, free of iron, 450 marks; No. 2, carrying some iron, 270 marks.

Manganese metal is quoted at 3.60 marks per kg.—38.8c. per lb.—delivered in Bremen.

Minor Metals.—For minor metals and their alloys, wholesale prices are, f. o. b. works:

	Per lb.
Aluminum.	
No. 1, 99% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	$1.00
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	45c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N Y.)	$2.75
Tantalic acid (N. Y.)	50c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best)	$1.25

Variations in prices depend chiefly upon the size and conditions of orders.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.45½	$0.47½
Peruvian soles and Chilean pesos	.41½	.44½
Victoria sovereigns	4.86	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Missouri Ore Market.

JOPLIN, June 3.

The highest price paid was $45 per ton, $1 lower than the previous week, and the assay basis ranged between $40 and $42 per ton of 60% zinc. There was an effort on the part of some of the buyers to crowd the assay basis on all ore down to a $40 level, but the purchasing agents of other smelters were alive to the situation and bought heavily at a cut in price of $1 per ton, where the buyers bearing the market were attempting to take it at a cut of $2 and $3 per ton. Lead prices continued unchanged at $57 for medium grades and $58 to $59 for a few select bins.

The zinc stock in the bins is sold, and the buyers are keeping it purchased as rapidly as it is being mined, with occasional purchases ahead. It is pretty generally understood now that the mine-owners will accede to the requests of their employees and close the mines down for two weeks on the first of July. The miners have had a very busy year, the large majority without loss of time since last July, when a two weeks' World's Fair holiday was given, and they are asking for two weeks next month. The organized operators have agreed to the movement, and it seems probable now that enough will voluntarily join in to reduce the output 3,500 to 4,000 tons. It is believed this course will aid the smelters in strengthening the price of metal.

Following are the shipments of zinc and lead from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	2,692,780	261,800	$64,190
Carterville-Webb City	1,595,390	431,200	45,790
Galena-Empire	1,699,390	143,110	38,070
Duenweg	1,125,670	151,760	27,960
Prosperity	479,580	55,980	11,650
Alba	539,960		11,600
Oronogo	353,090	19,950	7,060
Carthage	322,710		6,940
Aurora	672,000		6,120
Badger	250 320	3,500	5,260
Granby	317,000	21,000	4,100
Neck City	202,640		4,455
Zincite	123,070	10,930	2,940
Baxter Springs	64,250	50,190	2,610
Spurgeon	86,390	4,440	1,690
Sherwood	63,110	8,300	1,600
Central City	62,150		1,240
Beef Branch	38,210	8,540	730
Totals	10,687,680	1,167,200	$244,005
22 weeks	208,566,420	25,019,380	$5,427,205

Zinc value, the week, $210,415; 22 weeks, $714,525
Lead value, the week, 33,490; 22 weeks, 712,680

Monthly Average Prices of Metals.

COPPER IN NEW YORK.

Month.	Electrolytic.		Lake.	
	1904.	1905.	1904.	1905.
January	12 410	15 008	12.553	15.128
February	12.063	15.011	12.245	15.136
March	12.299	15.125	12.551	15.250
April	12.923	14.920	13.120	15.045
May	12.758	14.627	13.000	14.820
June	12.269	.....	12.399	.....
July	12.380	.....	12.505	.....
August	12.343	.....	12.468	.....
September	12.495	.....	12.620	.....
October	12.993	.....	13.118	.....
November	14.284	.....	14.456	.....
December	14.661	.....	14.849	.....
Year	12.823	.....	12.990	.....

Prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars; cathodes are usually 0.25c lower.

COPPER IN LONDON.

Month.	1904.	1905.	Month.	1904.	1905.
Jan	57.500	68.262	July	57.256	.....
Feb	56.500	67.963	August	56.952	.....
March	57.321	68.174	Sept	57.645	.....
April	58.247	67.017	Oct	60.012	.....
May	57.321	64.875	Nov	65.085	.....
June	56.398	.....	Dec	66.384	.....
			Av., year.	58.587	.....

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan	28.845	29.325	July	26.573	.....
Feb	28.087	29.262	August	27.012	.....
Mar	28.317	29.523	Sept	27.780	.....
April	28.132	30.525	Oct	28.596	.....
May	27.718	30.049	Nov	29.185	.....
June	26.325	.....	Dec	29.286	.....
			Av., year.	27.986	.....

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904	1905.
Jan	4.347	4.552	July	4.192	.....
Feb	4.375	4.450	Aug	4.111	.....
Mar	4.475	4.470	Sept	4.200	.....
April	4.475	4.500	Oct	4.200	.....
May	4.423	4.500	Nov	4.200	.....
June	4.496	.....	Dec	4.600	.....
			Av., year.	4.309	.....

SPELTER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	4.863	6.190	4.673	6.032
February	4.916	6.139	4.717	5.989
March	5.057	6.067	4.841	5.917
April	5.219	5.817	5.038	5.667
May	5.031	5.434	4.853	5.284
June	4.760	.....	4.596	.....
July	4.873	.....	4.723	.....
August	4.866	.....	4.716	.....
September	5.046	.....	4.896	.....
October	5.181	.....	5.033	.....
November	5.513	.....	5.363	.....
December	5.872	.....	5.720	.....
Year	5.100	.....	4.931	.....

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.430	57.832	25.578	26.664
June	55.673	.....	25.644	.....
July	58.095	.....	26.760	.....
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.730	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

Dividends.

Company.	Payable.	Rate.	Amount.
Calumet & Arizona	June 19	$2.00	$400,000
Calumet & Hecla	June 23	10.00	1,000,000
Copper Range	July 1	1.00	383,781
Federal Min. & Sm., com.	June 15	2.50	125 000
Federal, pf.	June 15	1.75	175,000
Greene Copper	June 20	.40	345,600
National Lead, pf.	June 15	1.75	260,820
Parrot	June 12	.50	114,915
Standard Oil	June 15	9.00	8,730,000

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt.
Centennial Copper, Mich.	Aug. 10	.....	2.00
Challenge Con., Nev.	June 14	July 7	.10
Confidence, Nev.	June 6	June 26	.20
Justice, Nev.	June 13	July 6	.05
Middle Yuba, Nev.	July 7	.....	.01
New Almaden, Mex.	July 20	.....	.00½
Overman, Nev.	June 16	July 7	.10
Potosi, Nev.	June 5	June 26	.10
Utah Con., Nev	June 9	June 30	.10
Yellow Jacket	June 27	Aug. 1	.10

STOCK QUOTATIONS.

NEW YORK

Name of Company.	Week, June 6. High.	Week, June 6. Low.	Closing. High.	Closing. Low.	Sales.
Alice					
Amalgamated	84⅞	78	81⅞	78	420,380
Anaconda	26⅜	26	26¼		4,300
Con. California & Virginia	1.75	1.60			300
Elkton Consolidated	.45				400
Federal Min. & Smelt					
Federal Preferred	93½	93			500
Greene Copper	25⅞	23⅜	23⅜	23⅜	13.200
Greene Gold	6⅛	4⅞	5¼	4⅞	17,700
Homestake					
Horn Silver	1.80				300
Iron Silver					
Isabella					
Little Chief					
Ontario					
Ophir	6.50	6.00	6.50		300
Portland	2.30	2.20	2.30		600
Quicksilver					
Quicksilver Preferred					
Standard	1.50				100
Tennessee Copper	25½	24⅜	24⅜		300
United Copper	25⅞	23⅛	24⅛	24	5.970

Total sales, 464,350.

BOSTON.

Name of Company.	Par Val.	Week, June 6. High.	Week, June 6. Low.	Closing. High.	Closing. Low.	Sales.
Allouez	$25	23¾	21¾	22¾	22⅛	9,135
Amalgamated	100	83	78	81¼	78	31,322
Atlantic	25	14	13	13½		800
Bingham Consolidated	50	29¾	28¾			3,025
Bonanza Development	10	.51				150
Boston Consolidated	10	8½	8¼	8¼		2,460
Calumet & Hecla	25	620	602	602		65
Catalpa	10					
Centennial	25	20⅛	18¼	18⅛	18¾	3,385
Consolidated Mercur	5	.50	.45	.45		2,800
Copper Range Consolidated	100	72	69½	70	69½	7,826
Daly-West	20	13	12¾			280
Elm River	12			2		15
Franklin	25	8¾	8			302
Granby	10	5⅞	5½	5⅝		3,885
Greene Consolidated Copper	10	25⅛	23	23¾	23	10,170
Guanajuato Consolidated	5	5⅛	4¾	5⅛		1,175
Isle Royale Consolidated	25	20¾	18¾	20	18¾	3,110
Mass Consolidated	25	8⅛	7½	8¼	8	2,255
Mayflower	25	.75				50
Michigan	25	12⅞	11½	12½	12¼	2,450
Mohawk	25	51	48¾	50		1,854
Old Dominion	25	25¾	24¼			891
Osceola	25	94	91½	91¾		1,875
Parrot	10	24¼	23			306
Phoenix Consolidated	25	1⅛	1	1¼		820
Quincy	25	100	97	99⅞		38
Shannon	10			8	7¼	1,350
Tamarack	25	114	107	110	109	208
Tennessee	25					
United Copper, common	100	25⅞	23⅞	24¾	24¼	2,950
United States	25	30⅞	28	28½	28	6,765
United States Coal & Oil	25	10¾	10¼			170
Utah Consolidated	5	44⅞	43	44	43½	7,460
Wolverine	25	110	108	108		96

Total sales, 109,443 shares.

MEXICO. May 27

Company.	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:			San Rafael y An., aviada	$655	$680
Penoles	$2,600	$3,000	Soledad, aviada	940	980
San Andres de la Sierra			Sorpresa, aviada	260	280
GUANAJUATO:			MEXICO:		
Cinco Senores y An., aviadoras	51	64	Aldebarren	32	38
Cinco, Senores y An., aviada	32	40	Buen Despacho	42	50
Providencia, San Juan de la Luz	143	148	Dos Estrellas	3,550	3,650
GUERRERO:			La Esperanza (El Oro)	1,500	1,500
Garduno y Anexas	30	30	Santa Ana, Esperanza	30	60
HIDALGO:			NUEVO LEON:		
Amistad y Concordia	62½	65	La Fraternal	580	620
Carmen aviada	160	174	Norias de Bajan	700	750
Guadalupe Fresnillo Mill	170	200	SAN LUIS POTOSI:		
Guadalupe Fresnillo Mine	70	80	Concepcion y An	20	30
Maravillas y An., aviador	75	100	El Barreno, aviadora	105	106
Maravillas el Lobo	130	180	Sta. Maria de la Paz	265	269
Refugia, aviada	5	7	ZACATECAS:		
Sta. Gertrudis y An., aviadas	6	10	Asturiana y An	8	12
Sta. Gertrudis y An., aviadora		65	Candelaria y Pinos	140	155
San Rafael y An., Trompillo	1,780	1,820	San Carlos y Annexas	15	20
			Sta. Maria de Gaud	77	80
			MISCELLANEOUS:		
			Bartolome de Medina	75	80
			Naica (Chihuahua)	11,000	13,000
			Natividad (Oaxaca) aviadora	700	750
			San Francisco Hac	78	84
			Union Hacienda	250	300

LONDON.

Company.	Par Val. £	s.	Latest dividend. Amt. s.	d.	Date.	May 25. Buyers. £	s.	d.	Sellers. £	s.	d.
American:											
*Alaska Treadwell	5	0	2	0	Apr., 1905	6	13	9	6	16	3
Anaconda	5	0	2	0	May, 1905	5	3	9	5	6	3
Camp Bird	1	0		9	May, 1905	1	12	6	1	15	0
El Oro	1	0		9	July, 1904	1	0	0	1	2	6
Le Roi	5	0	5	0	Nov., 1899		13	9	1	6	3
Le Roi No. 2	5	0	2	0	Jan., 1905		16	9		16	3
Montana	1	0		6	Apr., 1899			9		1	3
Stratton's Independence	1	0		6	May, 1905		10	3		10	9
Tomboy	1	0	1	0	Dec., 1904	1	0	0	1	2	6
Tyee	1	0	2	0	Dec., 1904	1	10	0	1	12	6
Utah Con	1	0	6	0	Jan., 1905	8	15	0	9	0	0
Ymir	1	0	1	0	Mar., 1902		1	3		3	9
European:											
Linares	3	0	5	0	Apr., 1905	4	0	0	4	10	0
*Mason & Barry	1	0	7	0	May, 1905	2	17	6	3	2	6
Rio Tinto	5	0	37	6	Apr., 1905	59	10	6	59	16	0
Rio Tinto, pf	5	0	2	6	Apr., 1905	6	2	6	6	7	6
*Tharsis	2	0	7	0	May, 1905	5	17	6	6	2	6
West Australian:											
Associated	1	0	2	6	July, 1904	1	15	7½	1	16	½
Golden Horseshoe	5	0	6	0	Apr., 1905	7	3	9	7	6	3
Great Boulder		2		9	Apr., 1905	1	1	6	1	2	0
Great Boulder Perseverance	1	0		9	Mar., 1905		12	3		12	9
Great Fingall	1	0	7	6	Apr., 1905	7	11	3	7	13	9
Ivanhoe	5	0	9	0	Apr., 1905	7	12	6	7	15	0
Kalgurli	1	0	2	6	Apr., 1905	7	11	3	7	12	6
Lake View	1	0	1	6	Oct., 1904	1	0	0	1	1	3
Oroya-Brownhill	1	0	4	0	Mar., 1905	3	5	0	3	6	3
Miscellaneous:											
Broken Hill		8	1	6	May, 1905	2	5	6	2	6	6
Mt. Lyell	3	0	1	3	Dec., 1904		17	6		18	6
Mt. Morgan	1	0		3	May, 1905	2	15	0	2	17	6
Waihi	1	0	2	6	Mar., 1905	5	15	0	5	17	6
Indian:											
Champion Reef		10	1	3	Apr., 1905	1	14	0	1	15	0
Mysore		10	5	6	Mar., 1905	7	1	3	7	3	9
Nundydroog		10	1	6	Mar., 1905	1	11	9½	1	13	1½
South African:											
Angelo	1	0	5	0	Feb., 1905	6	0	0	6	5	0
British So. Africa	1	0	rts.		May, 1899	2	0	7	2	1	9
City & Suburban	4	0	6	0	Feb., 1905	5	6	3	5	8	9
Consol. Gold-Fields	1	0	2	6	Dec., 1904	7	12	6	7	13	9
*Crown Reef	1	0	20	0	Apr., 1905	13	0	0	13	10	0
De Beers, preferred	2	10	10	0	Feb., 1905	17	18	0	18	1	3
De Beers, deferred	2	10	2	0	Feb., 1905	17	6	3	17	1	3
East Rand	1	0	4	0	Feb., 1905	7	15	0	7	8	9
Ferreira	1	0	2	0	May, 1905	19	10	0	20	10	0
Geldenhuis	1	0	5	0	Feb., 1905	4	8	9	4	11	3
Geduld	1	0	rts.		Mar., 1902	6	8	9	7	0	0
Henry Nourse	1	0	8	0	Feb., 1905	7	2	6	7	5	0
Knights	1	0				4	8	9	5	2	6
Langlaagte	1	0	2	0	Feb., 1905	3	6	3	3	8	9
Modderfontein	1	0	rts.		Apr., 1902	9	18	9	10	1	3
New Kleinfontein	1	0	rts.		Apr., 1902	2	2	6	2	5	0
New Primrose	1	0	3	0	Feb., 1905	2	10	0	2	12	6
Premier, def		2½	10	0	June, 1905	14	15	0	15	0	0
Premier, pf		5	6	3	June, 1905	9	1	3	9	3	9
Rand		5	5	0	Aug., 1904	9	15	0	9	17	6
Randfontein	1	0	rts.		Apr., 1899	2	12	6	2	13	9
Robinson	5	0	8	0	Feb., 1905	9	2	6	9	7	6
Robinson Deep	1	0	3	0	Aug., 1904	5	12	6	5	15	0
Rose Deep	1	0	3	0	Feb., 1905	7	7	6	7	12	6
Simmer & Jack	1	0		6	May, 1905	1	15	0	1	17	6
Village Main Reef	1	0	4	0	Jan., 1905	5	10	0	5	15	0
Wemmer	1	0	12	6	Dec., 1904	7	0	0	7	10	0

* Ex-dividend.

LONDON (*By Cable**).

Company.	June 6 £	s.	d.	Company.	June 6 £	s.	d.
Camp Bird	1	14	9	Esperanza	1	6	6
Consolidated Gold Fields	6	17	6	Modderfontein	10	0	0
De Beers	17	0	0	Rand Mines	9	11	3
Dolores	1	9	0	Rio Tinto	61	2	6
East Rand	8	16	3	Simmer & Jack	1	15	0
El Oro	1	0	7½	Tomboy	1	0	0

* Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York.

PARIS.

Company.	Location.	Par value. Fr.	Latest dividend. Fr.	May 18. Opening. Fr.	May 18. Closing. Fr.
Acieries de Creusot	France	2,000	75.00	1,935.00	1,950.00
Anzin, coal	France		290.00	5,850.00	5,849.00
Biache-St. Vaast	France	1,000	160.00	3,605.00	3,605.00
Boleo, copper	Lower Cal.	500	104.17	2,665.00	2,670.00
Bruay, coal	France	400	27.50	790.00	794.00
Courrieres, coal	France	500	110.00	3,109.00	3,149.00
Escombrera-Bleyberg, z.	France	350	35.00	713.00	710.00
Huanchaca, silver	Bolivia	125	2.50	86.50	83.50
Laurium, zinc, lead	Greece	500	25.00	331.00	337.00
Malfidano, zinc	Italy	500	50.00	645.00	647.00
Metaux, Cie. Fran. de	France	500	22.50	547.00	558.00
Mokta-el-Hadid, iron	Algeria	500	40.00	1,010.00	1,030.00
Nickel	N. Caledonia	250	22.50	696.00	693.00
Penarroya, coal	Spain	500	45.00	1,175.00	1,179.00
Vielle Montagne, zinc	Belgium	30	30.00	827.00	830.00

THE ENGINEERING AND MINING JOURNAL

Use of the Horn Spoon.

BY JOHN C. TREADWELL.

The length of time required to get results from the assay office, and the consequent delay in the handling of ore and waste in the mine, have led us to adopt a system of 'horning' at the Santo Niño mine in the Ocampo district, of Chihuahua, Mexico. By this method the result of the work done by each shift is known before the succeeding shift enters the mine, so that specific orders can be given to the foreman for the intelligent direction of operations underground.

The metals are contained in various kinds of gangue, most frequently in quartz and quartzose rock which has not been shattered by movement; the rule being that, when shattered portions of the vein are encountered, the assay value drops below the economic limit. The ore contains gold and silver in the ratio of about 6 to 1, the gold being free. Along one side of the vein there occurs a stringer which carries copper and silver. Again, each wall is well-defined greenstone-porphyry impregnated with pyrite. In many parts of the vein, manganese minerals occur abundantly as a loose black powder held together by moisture, and presenting the appearance of moist soot. It is a remarkable fact that gold does not occur in payable quantity in close proximity to this manganese; and, although attempts have been made to establish a constant relation between the ore and the manganese, such attempts have proved futile. Attempts at sorting, except in a rough manner, have proved useless, because rock which looks like ore is often only waste, and *vice versa*. At one time, when sorting was in vogue, assays showed the rock rejected as waste to be equal in value to that separated as ore. Sorting was discontinued, but there was need for results more prompt than those given by fire, and accordingly the system of 'horning' was established.

As the shift enters the mine, each miner is furnished with a small sack, together with a wooden tag indicating the particular working to which he is directed; and he is required, at the end of the shift, to deliver to the 'horner' the powder made in the course of drilling. This powder is horned, twice daily, by an old Mexican who has become very expert in estimating the amount of gold contained in any given sample. A unit horn-full being taken, he estimates the result in units of 'X,' an X representing about $10. The reason for using the symbol X instead of $, is that the estimator can neither read nor write, and the X or V or XX presents to his mind a definite quantity directly connected with the amount of gold in the spoon. In addition to the drillings, daily hand-samples are taken from all working faces; these samples are crushed coarsely and horned in the same manner as the drillings. One-half of each hand-sample is sent to the assay-office as a check on the hornings. About 90 per cent of the hornings which do not reach a value of more than XXX ($30) check to within $2 of the assay-value. In this way we have the results before us of the very rock drilled into during a given shift, and therefore of the rock broken, and to be handled, when the new shift goes on.

In addition to the X used in estimating gold, a number of other symbols are employed for noting the different minerals which are known to occur in the ore or in the waste, such as: B for (bronze) pyrite; Ag for any silver mineral; Cu for copper; Fe for hematite; Cop. for (*copalille*) mixed lead and copper carbonates; Pb for galena, etc. The advantage of noting the various minerals may be readily understood by an illustration. When pyrite persistently shows in the spoon, the indications are that wall-rock is being broken. With copper in the spoon the indications are that too much of the refractory streak is being drilled into; and, should an abnormal amount of silver appear, the ore will require special treatment in the pans and settlers.

In presenting this method, no originality is claimed, for every gold mine in Mexico has a number of men who are expert with the horn spoon, and the method (long employed in the Black Hills) of checking the milling results by panning was fully in mind at the time we adopted our present system.

West Virginia Coals.

BY NEIL ROBINSON.

In the year 1904 the State of West Virginia had an output of 32,335,385 short tons of bituminous coal—a tonnage that is exceeded only by the States of Pennsylvania and Illinois. In all, 593 producing mines are listed in the last published report of James W. Paul, chief mine inspector, and as many of them are new operations, it is evident that the regular increase in the annual volume of business will be maintained.

As nearly as can be determined from the geological data now available, 20 distinct seams are being mined at the present time. It would be interesting to have exact statistics showing the productiveness of each, but this is rendered almost impossible, on account of the pardonable mistakes by mine superintendents in correlating the seams they have opened. Each district has adopted a local nomenclature, and the 20 beds actually worked carry 42 names.

The following series of the Carboniferous system are exposed in the State above water level: Monongahela, No. 15, Upper Productive; Conemaugh, No. 14, Lower Barren; Allegheny-Kanawha, No. 13, Lower Productive; Pottsville, No. 12, Seral Conglomerate.

During the year ending June 30, 1904, the production by series was as follows:

	Tons Coal Produced	Used in Coke Ovens
Monongahela (Pittsburgh seams)	8,143,044	207,290
Conemaugh and Allegheny-Kanawha	9,754,795	924,395
Pottsville (Pocahontas and New River)	12,134,642	2,602,238
Totals	30 032,481	3,733,923

Dr. I. C. White, in his valuable report on the mineral resources of the State, estimates that we have "10,000 to 12,000 square miles of productive coal territory, reckoned by the standard of thickness and quality as exhibited by the areas now operated by drift mines."

It is perfectly safe to assume that the seams that are now opened carry at least 50,000,000,000 tons of minable and merchantable coal. I have calculated, approximately, the areas of the so-called Upper, Middle and Lower measures, and the total number of square miles (11,000) corresponds with the estimate by Dr. White.

	Sq. Miles	Per Ct.
Monongahela series	3,500	31.8
Conemaugh and Allegheny-Kanawha	5,000	45.5
Pottsville { Pocahontas, New River	2,500	22.7
Total	11,000	100.0

Taking 1,500 acres as a fair allotment, or reservation, for each of the 593 commercial mines in the State we have this showing: Coal area under development, 889,500 acres, or 12.5%; untouched, 6,170,500 acres, or 87.5%; total, 7,060,000 acres.

The coals are uniformly good, and cover every known fuel requirement. Fully 40% of the current production represents coals that are almost smokeless and fully equal to, if not superior to, the Welsh coals in heat units. It is probably only a question of a few years before the State becomes an active competitor for the markets of southern Europe, South America, etc. Three strong railway systems, the Baltimore & Ohio, the Chesapeake and the Norfolk & Western, furnish direct lines from the mines to the seaboard, and two new roads, the Deepwater-Tidewater and the Wabash, are now under construction. Fortunately for the State, the railway companies and the operators realize the permanency of the industry, and every modern appliance for the economical production and movement of the coal is being brought into service.

With established markets at home and prospective markets abroad; with almost six hundred mines in operation, and with excellent rail, river and tidewater shipping facilities, West Virginia will continue to increase the volume of its coal production until it becomes a close rival to Pennsylvania.

Steam turbines are commonly supposed to require that the supply of hot vapor be furnished at a high pressure; but a recent innovation proposes to use exhaust steam on low-pressure turbines. Practical men will watch with much interest this phase of economy in prime movers.

Gold in Santo Domingo.

BY F. LYNWOOD GARRISON.

One of the chief incentives, if not the most powerful, to the exploration of the western hemisphere by the Spaniards, was the hunger for gold. This was the motive that led to the discovery of Santo Domingo.[1] It is a curious fact, that although it was upon Santo Domingo that Columbus established the first settlement of white people and mined the first gold in the New World, this beautiful, fertile and healthy island, within a few days' sail of New York city, is scarcely better known to Americans of today than to the people of Spain in the sixteenth century.

Santo Domingo covers an area of 28,000 square miles—a little less than Ireland. in many respects it is today as little known as in the time of Columbus, its wild interior being unexplored, and in this respect it differs from all the other islands of the West Indies. Reference to the best maps show an orographic structure remarkable in several respects. The center of the island is one mass of mountains, pushing down on the south close to the sea, near the town of Bani. Two long mountain chains may be distinguished, the Monti Christi range on the north, separated from the *cordillera* or Cibao mass to the south, by the *Vega Real,* or Royal Plain of Columbus. This valley extends from the bay of Samana on the east to Manzanilla

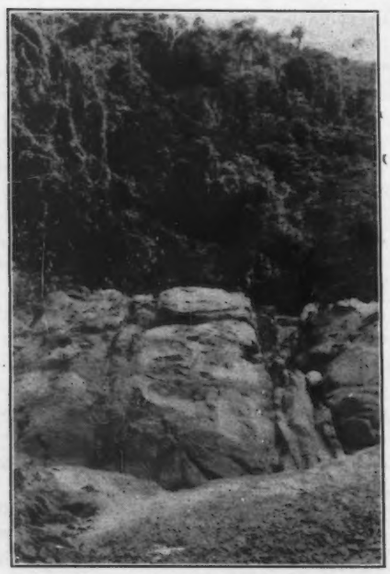


FIG. 1. CRYSTALLINE ROCKS IN THE BED OF NIGUA RIVER.

bay on the west, and there is no doubt these bays constitute part of the underwater section of a trough. South of the eastern extension of the Cibao range and east of the Haina river, extending from the mountains on the north to the sea on the south, is a great plain known as the *Seybo* or *Los Llanos.* This plain is the largest flat area on the island, and is also the most fertile, not being troubled with drought, as are many of the valleys to the west. By far the greater part of Santo Domingo is mountainous and rugged; that is why it is so fertile. The trade winds that come from the vast expanse of the South Atlantic blow with steady velocity across the island, a boon to its inhabitants. Some of the peaks rise more than 9,000 ft. above the sea, and ranges of 7,000 to 8,000 ft. are numerous.

It is difficult to realize the intense rugosity of the mountainous interior of Santo Domingo until it has been visited. Considered in relation to the plain, the altitude of the mountains is probably equal to any heights in North America or Europe. The existence of numerous high elevations has a most beneficial effect upon the climate, especially in the eastern portion of the island. In the interior,

FIG. 2. ANCIENT METHOD OF WORKING; AFTER OVIEDO.

among the mountains, every kind of climate may be found, ranging from tropical in the deep valleys to temperate at high points; and, whether hot or cool, it is everywhere healthy. Of course, there are swampy places, and possibly some of the enclosed valleys on the western side are malarial; but, on the whole, the climate leaves little to be desired. In the mountainous regions, the vegetation varies with the average temperature, the deep valleys having a more distinctly tropical flora than the higher parts. The geological structure of the island has given rise to a soil of unusual productiveness; the mountain slopes being often composed of relatively soft rocks, they are tillable to their summits; hence, notwithstanding the extreme ruggedness of the interior, the cultivable area is not greatly restricted.

Though so little is known of Santo Domingo, it did at one time have a geological survey. In the year 1869 some Americans agreed to provide funds for an economic geological survey upon consideration of receiving certain concessions and lands; the work was entrusted to William M. Gabb, an American geologist of reputation. In 1872 Gabb published the results of his three years' work, with maps, as a memoir in the *Transactions* of the American Philosophical Society, Volume XV, and, as far as I am aware, this is the only report upon the subject. Although this survey was obviously little more than a reconnaissance and of limited economic value, Gabb did identify and plot the main geological features. His determination of

FIG. 3. GOLD WASHING ON THE HAINA RIVER.

stratigraphical series appears to have been accurate; but, except in a very general way, his identification of the crystalline and metamorphic rocks was unsatisfactory. Much allowance, however, should be made for this shortcoming, owing to the fact that the science of petrography was unknown 35 years ago.

Since the publication of this memoir, no serious effort to investigate the mineral resources appears to have been made. During this long period, the island has been in a condition of somnolence, disturbed only by political revolutions, which have given the country an exceedingly bad reputation. Within the past two or three years some renewed attempts have been made to develop the copper deposits on the Nigua river, with encouraging results, although fifty years ago similar efforts on the part of certain Englishmen did not meet with definite success. Various mining concessions on the north side of the island have been granted recently; but, with the exception of an amber deposit near the city of Santiago, the island is today as undeveloped and unexplored as when Gabb concluded the survey. It is true, petroleum has been found near Azua, and, the exploitation being said to be in good hands, the outlook for its systematic development is encouraging.

According to Gabb, the central core of the island is composed of post-Cretaceous eruptive rocks, chiefly syenite, or what is now known as hornblende-granite. The

[1] This island in history sometimes goes under the Indian name of *Haiti* (mountainous country) or the Spanish name of *Hispaniola.*

oldest rocks appear to be the Cretaceous (which forms the base of the island), and have been elevated into a series of folds by the upward thrust of the extrusive molten rocks aforesaid. Strictly speaking, evidence of volcanic eruption does not appear, though future exploration may reveal it. It is certain, however, that none of the high peaks are volcanic cones, and it appears safe to say that the island has experienced no volcanic eruption since Cretaceous time. The popular impression that the island has what is commonly called 'a volcanic origin' is certainly incorrect. Hill[2] assumes that the general geology of Santo Domingo is much the same as that of Cuba, and in this he is probably correct, though, as I understand it, the oldest rocks in Cuba are Jurassic.

The uplifting of the sedimentary rocks has created the mountain axes, which correspond closely to a general northwest and southeast trend. Associated with the granites, and between them and the Cretaceous limestones and shales, are masses or zones of diorite and dioritic porphyry. It is in these rocks that we find the copper ores and, to some extent, the iron minerals. Gold associated with quartz is also common in them, usually in small veins or stringers, but sometimes in lodes 3 to 5 ft. wide. These undoubtedly are the source of the alluvial gold in the creeks and rivers of the island.

The lithological character of the Santo Domingo crystalline and metamorphic rocks is complicated. The sedimentary rocks have yielded no mineral products of value, except some petroleum near Azua and the amber deposits near Santiago. Lignite is found in the Cretaceous limestones, but, as yet, no beds have been discovered sufficiently clean and thick to be of economic value. The amber deposits are in sandstone, probably post-Pliocene. The commercial value of the deposits is undetermined, although the quality of the amber appears to be exceptionally good.

It must not be assumed that all the extrusive rocks on the island are of the same age, as there appear to have been several different periods of outflow, the pre-existing crystalline rocks being cut by later dikes and intrusions of a somewhat different character. This is well shown in Fig. 1, a mass of rock in the bed of the Nigua river near the San Francisco copper mines. All the crystalline rocks in the vicinity of the copper deposits on the Nigua have a decided basic character, the granitic rocks being, as a rule, barren of valuable mineral. The streams flowing through the granite areas are usually devoid of gold, unless they have previously cut through some basic rocks.

The existence of gold upon the island was evident to the Spaniards at the time of their first landing. The *caciques*, or chiefs, especially appeared to possess it in quantity. Columbus and his followers, having once established themselves on the island, naturally sought for the origin of this gold, and various expeditions were sent into the wild interior, then, as now, known as the Cibao region. Here it was

FIG. 4. WASHING GOLD.

evident the natives obtained most of their gold by a simple process of washing the gravel and sand of the river beds. If we are to believe the old historians, it was the discovery of gold on the Haina river that was the indirect cause of the found-

FIG. 5. OUTCROP OF COPPER VEIN ON NIGUA RIVER.

ing of the city of Santo Domingo. Its early history is enveloped in a cloud of romance, from which the modern writer Hazard has sifted out the following facts:[3]

"When the Spaniards were originally settled at the town of Isabella on the north coast, one of their number, Miguel Diaz, having a difficulty with a servant of Don Bartholomew Columbus, stabbed him, as he thought, to death, and, fearing the consequences of his act, fled into the woods, and finally wandered to the south of the island, where, entering the domain, on the banks of the Ozama, of one of the native princesses, the latter eventually became enamoured of her Spanish guest, and it is even said they were finally married. Diaz appears to have become somewhat tired of this princess after a while, and longed for the presence of his countrymen; and his wife, noticing his melancholy, and hoping to make him better satisfied, proposed to him to bring his companions to that region, telling him also, as an inducement, of the gold to be found in the vicinity of the river Haina. Diaz, big with this news, appears to have sought the vicinity of Isabella, and while loitering about there, learned that the man whom he supposed dead was still alive; and thus feeling it safe to return, entered the town and made known to Don Bartholomew Columbus the news of the gold mines of the Haina. Bartholomew immediately took steps to verify this fact, and finding it true, received the orders from his brother the admiral to found a town in the vicinity." (This town is the present city of Santo Domingo on the Ozama river.)

From this time onward, for a number of years, the Buena Ventura washings, together with several others in the Cibao region, near the modern towns of Santiago and La Vega, appear to have yielded large quantities of gold, through the enforced labor of the natives. This production seems to have continued with little variation, until the labor supply became greatly restricted, through the rapid extinction of the natives. These poor creatures, unaccustomed to hard work, and driven as slaves by the avaricious Spaniards, died like sheep from various causes, most prolific of which appears to have been suicide.[4] The quantity of gold produced by such means was undoubtedly large; the old Spanish writers give estimates ranging from $200,000 to $1,000,000, as the annual production between the years 1502 and 1530.

It is probable that the larger figure was attained in but two or three instances, the general yearly average being considerably less than $1,000,000. According to the testimony of Lewis Judd before the United States Commission in 1870-71, p. 227, "The old Spanish historians show that $30,000,000 gold and silver was annually exported at one period, shortly after the time of Columbus."[5] The great discrepancy between these figures and those already quoted I cannot explain. It is probable that there was much more gold

[2] 'Cuba, Puerto Rico with other Islands of the West Indies.' Robt. T. Hill, New York, 1898, pp. 27-236.

[3] 'Santo Domingo, Past and Present,' New York, 1873, p. 216. This book has a valuable bibliography.

[4] See Antonio de Herrera, *'Descripcion de las Indias Occidentales.'* 4 vols. Madrid, 1730.

[5] 'Report of U. S. Commission on Santo Domingo,' Washington, 1871, p. 125.

mined than the official returns of the time would indicate, and it is likely Judd's statement is exaggerated. All things considered, however, it is certain that the production at the time of Columbus was quite large, and when we consider that all this gold was obtained by the most primitive methods, the yield was certainly remarkable.

In certain parts of the Haina River basin there are numerous pits, often 10 to 15 ft. in diameter, that were made in search of gold during the old Spanish times. It is evident that the clay and gravel from these pits was carried to the nearest streams and there washed, as shown in Fig. 2, which is an old drawing published by the Spanish historian Oviedo in 1547. As might be expected, the gold in the upper Haina river is coarse; it is also of a deep yellow color, showing a high degree of purity. According to Blake, an assay of 12 oz. of the Haina River gold, made at the United States Mint in 1870, showed a fineness of 0.946.[6]

In the northern part of the island—that is, on the northern flank of the Cibao—alluvial gold is found in a number of places, especially in streams flowing from these mountains into the Yaqui river. In the early days Santiago appears to have been the headquarters of those engaged in gold washing; likewise, we are told, that the old town of Cotui was called *Las Minas*, from the fact that there were so many living there who worked in the neighboring mines. We are also informed that as early as 1502 as much as 240,000 gold crowns were minted at the town of La Vega, and that most of the gold came out of the Cibao.[7] Since the old Spanish time, for at least a space of 350 years, the production seems to have been insignificant, and at present is practically *nil*. Now, it certainly cannot be contended, as did Rothwell[8] in 1881, that these alluvial deposits were exhausted by such simple hand-washings as were used by the old Spaniards. It is absurd to conclude that the large areas of river and bench gravels, in various parts of the island, known to be rich in gold, could have been worked out by these primitive methods. The old Spanish writer Oviedo shows the common methods of washing in his time (Fig. 2). It is evident from this illustration and an examination of the remains of the gold washings, that the gravel excavated from shallow pits was carried to the nearest streams in baskets and bowls and washed out in precisely the same way that is still practiced by the natives of Santo Domingo (illustrated in Fig. 3 and 4). Instead of a pan of sheet iron, such as we use, the natives employed a wooden bowl or dish, known as a *batea*. In operation, whether by pan or *batea*, this primitive process of gold-washing is much the same the world over. The operator fills his or her bowl or pan with the gravel, obtained as near as possible from bedrock; then, by a rapid jerking and tilting of the vessel, a circular motion is imparted to the water, so that the heavier particles of iron-sand and gold collect in one spot away from the lighter material, which is scraped out from time to time as the operation proceeds, until little else than black sand (magnetite) and gold remain. The iron-sand is separated from the gold when dry, by careful blowing with the mouth or by a small hand-magnet. The skill of the native women of Santo Domingo in performing this washing operation is remarkable, and exceeds any I have witnessed in other parts of the world.

The richness of the gravels is, of course, variable in Santo Domingo as in other countries, and is determined by conditions that are now fairly well understood by experienced miners and engineers. It will suffice to say that in general we may consider the stream-beds as natural sluice-boxes, in which nature has been slowly washing and concentrating the gold out of the innumerable veins in the neighboring rocks for thousands of years. Often old gold-bearing stream-gravels are covered by lava-flows and other secondary deposits; in fact, the exploitation and mining of this class of gold deposit has, in California and Australia, been developed into a specialty demanding much skill, experience and large capital.

Quartz veins are, of course, known in a number of localities in Santo Domingo, but whether they will pay to work is a question yet to be determined. The general impression seems to be that they are small and rather lean, but it is impossible to say how far this conclusion is justified.[9]

The thorianite of the island of Ceylon (according to a paper by Dunstan and Blake, presented at a recent meeting of the Royal Society of London) is valuable as an ore of radio-activity. About 80% of the mineral is thorium oxide, itself a commercial unit, to say nothing of the rare earths of uranium and other metals which compose the rest. The mineral, thorianite, is itself radio-active, and when dissolved in acids it gives off helium; so that its properties and composition are quite in line with the accepted characteristics of radiferous chemistry.

[6] 'Report of U. S. Commission on Santo Domingo, Washington,' 1871, p. 125.

[7] A Spanish crown or half pistole is equivalent to $1.95.

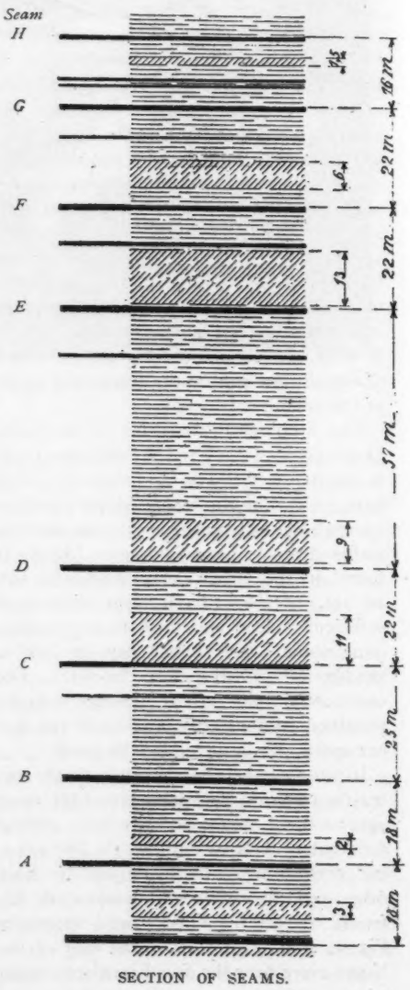
[8] *Transactions* Amer. Inst. Min. Eng., Vol. X, p. 345.

[9] Quite recently Dr. Edward Goldsmith, of Philadelphia, has called my attention to the existence of rhodium associated or alloyed with Santo Domingo gold. He told me that, some years ago, the late F. A. Genth confirmed the observation. Rhodium-gold appears to have been first described by del Rio (*Ann. Ch. Phys.*, 2d Series, XXIX, 137), and according to this authority the compound contained 34 to 43% of rhodium and had a sp. gr. of 15.5 to 16.8. Dana calls this compound 'rhodite,' and refers to Adam ('Tableau Min.,' 1869, p. 83). Neither in Dana nor in any of the other references is the locality mentioned from which this alloy or compound came. The subject has certainly a scientific interest.

The Compression of Stope Fillings.*

BY JACOB OBERHAUSEN.

In the Ruhr coal district, there is a saying that "when the rooms are filled with waste, the settling which takes place does not exceed 40 per cent. of the thickness of the seam; but is usually less." Up to the present no definite data relating to the matter have been published. Certain small-scale experiments, made at shaft No. 2 of the Kaiser mine, by means of a brick machine, confirmed in a general way the supposition referred to. The results show, for the various materials used for filling, an average compressibility of 32.3 per cent. The data are given in Table I.



SECTION OF SEAMS.

The field of operations of the company lies chiefly in a district frequently flooded by the Rhine and the Ems. This induced the management to adopt the plan of filling the workings, in order to obviate the surface depressions incidental to mining. In the area tributary to shaft 2, near Marxloh, this system has been carried out in a most complete manner. The daily production of 2,300 tons is from rooms which are afterward completely filled, together

*Abstracted from a translation (from *Gluckauf*) by C. R. Corning and Robert Peele, in the *School of Mines Quarterly*, Columbia University, April, 1905.

with the adjacent development work. The strata overlying the coal formation have an average thickness of 220 m. and consist largely of the younger formations, mainly Upper Cretaceous. The seams mined are those marked No. 1 and *A, B, C, D* and *G* on the accompanying section, and are at an average depth of 370 m. These seams vary in thickness between 1.8 and 0.5 m., averaging 1 m. The regular dip to the northwest usually does not exceed 25°, except in the western portion of the area, where, in the neighborhood of a fault, it reaches 60°. Its average is not over 15°. Between the individual seams the formation consists chiefly of clay-slates, sandstone, and sandy shales occurring only in three horizons, each 20 m. thick, situated respectively between seams *C* and *D*, *D* and *E*, *E* and *F*.

The methods of mining employed, which depend on the nature of the seams and various local conditions, are as follows: (a) Strebbau, longwall working, on strike or dip, either with straight face or series of stepped or offsetting faces; (b) Stossbau, overhand breastwork, on the strike or to the rise, in horizontal slices, with use of filling; (c) Stoss-firstenbau, overhand breastwork, in steeply dipping seams.

The material which was used for filling comprises: (1) Waste rock broken in mining the coal; (2) waste rock broken in prospecting and development; (3) waste picked out from the run-of-mine at the surface; (4) granulated slag from neighboring iron works. For the normal production of 2,300 tons per 24 hours there are used as filling: Of No. 1, 125 tons (250 loads); of No. 2, 250 tons; of No. 3, 15 to 20 tons; and of No. 4, 200 tons. This filling is conveyed to the working places partly through the air-ways and partly through the haulage gangways.

During the past year, at the Kaiser mine No. 2, it has been decided that air- and haulage-ways that must be maintained for a long period of time are best run through the old stope fillings. For this reason, several considerable portions of the mine, which were worked out some years ago and subsequently filled, were again opened by drifting through them. The observations made in the course of this work are shown herewith (Table II).

The thicknesses of the worked-out and filled seams were measured at a number of places during the driving of the new drifts, and the resulting averages are shown in the third and fourth columns of the table. By comparing the figures in these columns, a coefficient is obtained showing the compressibility of the filling. This is given in column 5 as a percentage of the original thickness. Self-acting inclines, raises and air-ways were driven through the various worked-out areas detailed in columns 6, 7, 8, 9 and 10.

In columns 13 and 14 is noted the character of the country rock and of the filling as found in place where penetrated by the

TABLE I.

Character of Filling.	Weight per Liter, kgs.	Thickness of Filling. Before Applying Pressure, m m.	Thickness of Filling. After Applying Pressure Three Times, m m.	Percentage of Compression, Referred to Original Thickness.	Remarks.
White granulated slag.	0.550	74	39	47	The space in the press charged with filling was 255 m.m. long, 123 m m. wide and 74 m.m. deep.
Gray granulated slag.	0.722	74	42	43	
Dark gray granulated slag.	0.858	74	45	39	
Black granulated slag.	1.201	74	49	34	The pressure die, weighing 700 kg., was dropped a distance of 142 m m.
Ground clay slate, up to 5 m m. in size.	1.204	74	56	25	Material to be tested had to be comminuted before charging the press.
Ground micaceous sandstone.	1.297	74	59	21	
Ground sandstone.	1.317	74	61	18	
Mason's sand.	1.250	74	53	28	
Cinder.	0.742	74	44	41	
Coal slack.	1.024	74	54	27	

TABLE II.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Designation of Coal Seam.	Dip of Seam.	Thickness. Before Stoping.	Thickness. After Stoping.	Per cent of Compression, referred to original thickness.	Size of Workings. Length on Strike.	Size of Workings. Length on Dip.	Size of Workings. Area Worked Out.	Average Depth from Surface	Age of Workings at Time of Reopening.	System of Mining.	Composition of Filling.	Character of Material through which new Gangways were Driven. Country Rock.	Character of Material through which new Gangways were Driven. Filling.
	Degs.	mm	mm		Met	Met.	Sq. Met.	Met	Years.				
1	13	1,750	1,250	29	180	80	14,400	370	8	Stossbau; all drifts and inclines being filled with waste	Waste rock: slates and sandstones from surface.	Hanging wall hard, foot-wall swelling ground.	Filling somewhat brecciated, completely compressed, very hard and had to be shot out.
1	16	1,790	1,290	28	260	80	20,800	450	2	Stossbau, as above.	Granulated slag and waste rock (clay slate) from development work.	Same as above.	Same as above, but still more brecciated in appearance.
A	15	1,070, including 290 mm. caved.	680	37	520	200	104,000	360	5	Strebbau; gangways and inclines only partially filled.	Waste from the seam, and from roof and foot-wall.	Hanging wall broken in large slabs; foot-wall hard and unaltered.	Same as No. 1.
B	10	1,355	820	39	440	60	26,400	300	4	Stossbau and Strebbau; same as A.	Same as A.	Hanging wall hard, foot-wall swelling ground.	Same as No. 1.
C	10	820	330	60	300	120	36,000	270	5	Strebbau; pillars 6 m. wide. Gangways and inclines 2 m. wide and remaining open.	Waste rock from bottom of gangways.	Hanging wall cracked but hard; foot-wall swelling ground.	Filling not entirely compressed; had flowed into portions of gangways. Could be broken by pick.
D	13	1,105	875	21	300	70	21,000	380	2	Strebbau; drifts and inclines being filled.	Waste rock from surface, with granulated slag and clay slate.	Same as C.	Same as No. 2.
G	36	1,075	780	28	320	80	25,600	440	2	Stossbau; filling same as in D.	Same as D	Same as No. 1	Same as No. 2.

various new drifts. In all cases, excepting perhaps in seam *C*, it is evident that the settling within the seam itself had ceased. Between the foot-walls and the hanging the filling was hard and tight, having been even squeezed into fissures and cracks formed in the adjoining country rock. The filling forms a compact, breccia-like mass, and has been re-cemented, especially where granulated slag was used, into a hard material which could be broken only by blasting.

A comparison of the various data shows that in stossbau and strebbau, when granulated slag and broken rock were used for filling (seams 1, *D* and *G*), and when the drifts and inclines were filled at the same time, the settling was a minimum, averaging, as calculated, about 26.5% of the original thickness. The settling was observed to be much greater when, instead of introducing outside rock, the filling was composed of country rock broken in the adjacent development work. Especially is this true when the drifts, self-acting inclines, etc., were only partially filled (seams *A* and *B*). Under these conditions the settling amounted to 38%. In seam *C* the rooms were only partially filled to a breadth of 6 m. with waste broken in the drifts. The adjoining drifts, which were 2 m. wide by 1.5 m. high, were originally left open, and have not yet closed completely. Such material as they contain has in part been squeezed into them from the rooms. Here the settling has not ceased, although already amounting to something like 60% of the thickness of the seam (Table II).

Observations made in seam *C* indicate that with partial filling, that is, without introducing outside material to supplement the waste from the mining operations, and without filling the drifts and inclines, the amount of settling will still be materially less than that resulting from a system of mining with no filling whatever. The results confirm in a measure the view generally accepted in the Ruhr district concerning the amount of settling which takes place when rock filling is employed; that is, when the filling is carefully and completely carried out, there need not be more than 30% settling.

German Iron Production.

The output of the blast furnaces in Germany in April, as reported by the German Iron & Steel Union, was 894,393 tons of pig iron; being 1,545 tons less than in March, but 221,890 tons more than in February. For the four months ending April 30 the production was as follows, in metric tons:

	1904.	1905.	Changes.
Foundry iron	584,571	552,801	D. 31,770
Forge iron	282,174	255,493	D. 26,681
Steel pig	195,452	205.618	I. 10,166
Bessemer pig	161,123	113,858	D. 47.264
Thomas pig	2,071,832	2,101,213	I. 29,381
Total	3,295,151	3,228,983	D. 66,168

Thomas, or basic, iron was 65.1% of the whole production.

The Dolores Mill.

BY JOHN SEWARD.

While on a recent trip through Chihuahua, in Mexico, I was fortunate in being able to make a short inspection of the property of the Dolores Mines Company. This company is operating at Dolores, 120 miles off the railroad from the town of Minaca, whence it is reached over an exceptionally rough trail through the mountain ranges which extend north and south in the western part of the State. The company has developed its property pending completion of the mill, which is illustrated in the accompanying picture; and much credit is due J. G. Hardy, the manager, for its construction under what were probably as difficult conditions as are ever encountered. The mill is exceptionally well built and is high class in every particular. One remarkable feature is shown by the fact that every piece of machinery had to be transported 120 miles on pack animals through the mountains; and though the design is sectionalized, yet the larger castings had to be broken for transportation. Pieces weighing as much as 495 lb. were carried by mule.

The essential points in the scheme of ore-treatment are as follows: The ore is a gold-silver quartz with mineralized inclusions of encasing country rock. Coarse crushing by 15 stamps is followed by classification in cones and re-grinding of the coarse particles in three 4-ft. Bryan mills. Further classification is then given in other cones, and the sand is sent to a tube-mill, 16 ft. long and 42 in. diam. The tube-mill discharge is again classified, and the combined slime product is sent to seven collecting and agitating tanks, 22 ft. diam. by 15 ft. deep, and there cyanided. Agitation of the collected pulp is effected by radial arms and two 6-in. Morris centrifugal pumps fitted with manganese-steel liners. The pulp then gravitates to two final wash-tanks and is thence sluiced to the dump. A part of the richer silver ore is selected by means of a picking table which follows the rock-breakers; and this class is separately crushed in a stamp battery and Bryan mill; it then goes to a plant of four 5-ft. pans and two settlers for amalgamation. The sand from these pans is treated in a small plant, which also receives any oversize from the final classification of the slime, the slime from the pans being added to that which goes to the main slime-plant. The decanted solution from the slime-plant and the percolation from the sand-plant go to a central extractor-house, provided with the requisite zinc-boxes, acid-treatment vat, and filter-press clean-up equipment.

DOLORES MILL.

Ferro-chrome is made by the Goldschmidt (thermite) process.

The complete reduction of zinc oxide by carbon is attainable at a temperature of 1,320° C. The boiling point of zinc lies in the vicinity of 1,090° C.

The total hydro-electric horsepower of upper Italy is about 160,000, with an annual increase of 17,000 horsepower.

By a decree of the Peruvian Government, dated March 17, 1905, it was made incumbent upon the Government corps of engineers, known as the Cuerpo de Ingenieros de Minas, to investigate the system of exploitation employed in the mines at Cerro de Pasco, and to submit to the Government an opinion as to the precautions which should be used by mining enterprises there to protect the life and welfare of the miners. The corps are further instructed to formulate a special set of rules to guide owners of mines situated in the region immediately outlying the town of Cerro de Pasco. The text of the decree states that although the power to protect the life, safety and welfare of miners is usually vested in the nearest local authorities, the Government finds it necessary to place this matter directly in the hands of the Cuerpo de Ingenieros, because of the numerous accidents which have occurred in the mines at Cerro de Pasco.

Health in Mining Camps.*

Health is man's credit at the Bank of Life. In no occupation is it of more importance to success to have a good bank account to start with, and to husband it with care, than in that of a mining engineer.

In foreign countries and on the frontier the life may be one of exposure; the mining camp may be at a distance from medical aid, and there may be no substitute to take the responsibility of the work if the engineer falls ill. In any case the mining engineer is responsible to his employer, not only for his own health and therefore efficiency, but for the ability of his men and animals to do their work.

The stories of successful explorers and pioneers show how, by knowledge and care, they have come safely through great dangers to health; on the other hand, instances are on record where important enterprises have failed because of incompetence of the leaders to maintain health and therefore to carry through the work.

Good health means not only a good appetite and present physical strength, it means a sound heart, firm-walled blood-vessels (not weakened and dilated by the use of alcohol) in which circulates freely a nutritive blood-stream not liable to sustain disease germs the instant they get into the current. Immunity from disease is largely dependent on the germicidal quality of the blood-stream; for the rest, safety depends upon keeping out hurtful germs.

The avenues by which danger enters are chiefly the nose and mouth. The warm, moist throat, with its secretions as nutritive *media*, favors the development of tonsilitis, diphtheria, pneumonia, tuberculosis, and the like. The stomach and intestines offer ideal incubating receptacles for the germs accompanying typhoid, dysentery, cholera, etc., from whence they may migrate to any chosen locality in the body.

The proper channel for the air to enter the lungs is through the nose, a passage furnished with fine hairs and moist surfaces to serve as a sieve, and long enough to permit the air to be moistened and warmed. The open-mouth habit, especially in a dry and dusty climate, is responsible for a large number of respiratory diseases. This fact should be borne in mind when working in dusty mills and mines, and when on journeys over dry plains.

The entrance of germs through the mouth can be prevented only through scrupulous cleanliness. Clean hands mean much in primitive life. Finger nails harbor myriads of germs; hands take from other hands, from door-knobs and utensils which others have handled, moist or dry disease germs. As we know from sad experiences of army camps, flies are among the great carriers of disease from the carelessly deposited *excreta* to the person or the food. Other insects, as well as dogs, may act as *media*. Worm diseases are also due to carelessness. To guard against all these, use freshly cooked food, eaten as soon as off the fire, without handling; this is one of the most important rules to go by. A danger to one is a danger to all, hence the engineer, in the absence of the housekeeper, should see to the sanitation of his camp, that fingers and flies can have no chance to bring fresh disease germs to the food, and should instruct the camp cook as to the importance of cleanliness of dishes and freshness of his cooking, and the disposal of all waste beyond the reach of flies.

In dry climates the *excreta* should be buried, so that the dried particles may not mingle with the fine earth carried miles by the winds. The older the camp the more danger from crowding and from previous carelessness. Where fuel is plenty the cremation of all refuse is desirable.

There is in many cases little choice as to the kind of food; one eats what is provided. Many so-called coarse and hearty foods—beans, heavy bread, cheese, raw cereals and tough meat—may be made digestible by prolonged chewing. This thorough mastication also renders palatable many foods otherwise repugnant.

Indigestion is to be guarded against most carefully by forming right habits, not by constant worry and fear of it.

When chilled or when over-tired only small quantities of liquid food should be taken. Diarrhea may be caused by spoiled fruits and vegetables.

When 'run down' physically, three eggs for breakfast every day for two or three weeks are a powerful restorative. For those who can eat cheese it offers a valuable means of keeping up mental and physical force; it should be thoroughly masticated.

Beside the food so essential to keep up man's strength and to renew the waste, liquid—water—is even more needful to enable the food to circulate and be carried to each tiny cell, where a certain dilution is required to permit the chemical and physical reactions which maintain life. About 6 lb. of water are needed daily, and in hot and dry climates, where skin evaporation is greater, as many as 10 may be required. The 3 or 5 quarts of water ration, of course, includes the moisture in the food.

Camp food is apt to lack the fruits, vegetables and mushes of the city table. Bread and bacon, pork and beans, are very concentrated (thirsty) foods, hence the universal tea and coffee of the camp. Long and bitter experience convinced the pioneer that boiled water was safer, and what he did not know proves true—the tannin of the tea and coffee probably acts germicidally. There is danger to the digestion, however, in making these decoctions too strong. They should be infusions, using short exposure of the tea or coffee to the action of the boiling water.

Whisky is undoubtedly a good germicide, but the fact that all alcoholic drinks dilate the blood vessels, thus in time overcoming their elasticity, leaving them like a weakened rubber tube, makes the miner shun this form of making a safe drink, except in emergency when he is away from a fire. For the same reason beer should be reserved for those occasions when nothing else will serve. Beer thickens the blood-stream at a time when it should be diluted. Water is the universal solvent, and the blood of the man has its coefficient of fluidity just as much as the pulp of a gold mill.

The water supply of the camp is therefore one of the first cares of the engineer if he is in charge; and the very first object of inquiry of each individual at a new camp should be, Is the water safe? If the source is doubtful, boil all that is used, not only for drinking, but before putting in the food to cook. The boiling will take out the temporary hardness (bicarbonate), and if boiled with a little of the cooking soda which every camp has, most of the permanent hardness (sulphates) may be removed. The softening of hard water improves it as much for cooking as for washing. Many a man of genius would be alive today had he conformed to these simple rules.

Alkaline waters should be distilled for camp use, and there are now small stills for that purpose which may be taken in the camp outfit, and larger ones for more permanent camps which, with comparatively little trouble, will give safe water. It is only needful to realize the value of these precautions in regard to water supply.

The newcomer must be prepared to endure the scoffing of the old-timers, who say, as do the Eastern farmers of their wells, "This water hain't never hurt me." He may rest upon the well-established fact that disease germs, like many troublesome insects, attack a recent arrival with more virulence. Old residents appear to become immune. Even slight illnesses cause a loss of time and strength—too much to pay for little self-indulgences.

The third essential condition of the health of the living cells of which the human body is made, is temperature.

Given food and water, the body heat of 98° is needed for the cells to do their work and give nutritive compounds, and not poisons. The most toxic mixtures may be made in the body itself, and the friendly soldiers inside us (white blood corpuscles or phagocytes) be put to sleep or disabled; *then* is the waiting enemy's chance, and the enemy is always waiting in places where people have lived before.

'Keep warm' is an axiom as important as freshly cooked food and safe water. Indeed, it often comes first in the successful defense. So important is a free circu-

*Prepared for the students of the Mining Department of the Massachusetts Institute of Technology.

lation of the blood-stream that when mentally tired and worried a brisk walk or other form of exercise for twenty minutes or half an hour is usually more restful than a nap, partly because the body becomes chilled when quiet, and partly because exercise shakes out the ashes and leaves the body fires free to burn. If heated do not sit in wet clothes. Cool off with a douche of cold water after a rubdown, or stand a few minutes in a cool breeze with the shirt removed; this closes the pores and leaves the skin safe from a chill. Chilling oneself immediately after eating, or eating when one is chilled, gives violent attacks of indigestion. It is possible to be too warm, but there are fewer cases of sunstroke in mining camps than in city streets. The air is drier, and work is less out in the sun.

Mines are not apt to be in malarial districts, but it is now generally known that mosquitoes carry malaria and yellow fever, therefore they must be kept out from the temporary camp or while traveling, as a precautionary measure. This is most necessary if there are villages of natives who may have served to infect the mosquitoes.

The pleasure of feeling equal to one's work, the conscious power given by good health, once experienced, should compensate for the little cares and self-denials incurred in acquiring them.

Concrete Piles.

Scarcely a week now passes in which some new use of concrete, plain or reinforced, is not reported. Successful experiments have been made with this material to replace wooden piles, for use under water. The method adopted was as follows: A sheet-iron cone-shaped case about 20 ft. long, tapering at one end and widening at the other to about 2 ft., the center being reinforced with a stout iron rod, was employed as a base. This was driven into the required position, much as an ordinary pile would be used. The reinforcement was then removed, and the hollow interior filled with portland cement. On hardening, this was found to have formed a pile that would sustain an appreciably greater weight than its displaced wooden prototype, with the additional value of not being subject to decay. The sheet-iron cores were left, as doing no harm and being difficult to remove.

It has been observed that the elongation and tensile strength of steel castings of given carbon, like those of crucible steel, correspond with those of bessemer and open-hearth of lower carbon.

The progress of American practice in rolling rails has reached such a degree of rapidity that a new term, 'squirt,' has been evolved to describe the 15-ft. per sec. rate. This is equal to a stream of iron rail with a velocity of 10 miles per hour.

The Gayley Dry-Air Blast.*

It will be remembered by all readers of this JOURNAL that the paper of Mr. James Gayley was published *in extenso,* in the issue of October 27, 1904, and that it came both as a novelty, and as a promising one, considering the high authority from whom it originated. Among the assembled comments on this remarkable paper, the following are of interest:

Mr. E. Windsor Richards notes that as long ago as 1799 a Mr. Dawson, of Low Moor, England, read a paper emphasizing the great difference between the moisture of the air in the hot and the cold months.

Dr. R. W. Raymond and Mr. E. H. Saniter both emphasized the point that the uniformity of the air, whether moist or dry, is a most significant and desirable condition of practice, and one that is made possible by the Gayley process.

Mr. W. J. Fulton emphasized the different conditions pertaining to cold and hot blast, and some complications relative to the heats of dissociation and reduction of the latter.

Prof. H. M. Howe said that "the value of Mr. Gayley's invention was so great that one could hardly rate it justly without danger of seeming theatrical." He figured a saving of 20% of the 66,000,000 tons of coal required for the 46,000,000 tons of coke consumed by the world's annual output of the 46,000,000 tons of pig iron.

Mr. V. Pendred wrote in a conservative way, suggesting that the conditions at the Isabella furnace were exceptionally favorable in the increased density of cooled air.

Mr. B. H. Thwait, of London (famous for his work on the utilization of waste blast-furnace gas in auxiliary engines), wrote in a commendatory way. He summed up the debit and credit of the new scheme (as presented by Mr. Gayley) as follows: Debit, thermal loss in compressing air; ditto in lowering temperature of air, some 53° F.; reduced calorific value of gas; reduced sensitiveness of gas to ignition; expenditure required for refrigeration, superintendence, and stoves. Credit, greater density of air, involving less blowing-engine power for same weight of air; less resistance to flow of gas through furnace-burden, owing to greater uniformity of conditions; greater control over furnace practice, especially in proportion of silicon; reduced iron-ore waste. Net credit balance, 20% greater output of iron; 20% reduction of fuel per unit of pig-iron output; reduced iron-ore waste, and greater control over silicon range. He inferred an argument for the replacement of steam by gas power.

In reply to the discussion and correspondence, Mr. Gayley brought up many points in rebuttal, among them being the advantage that drying the air finds its equivalent in the increased, and more available, temperature of the hot blast.

Mr. Alexander Pourcel, of Paris, wrote discussing the difference of conditions between European and American practice. He reiterated the contentions of H. Le Chatelier (already noted in part, in this JOURNAL, Jan. 19, 1905, p. 141), and concluded with the observation that, however desirable the regularity obtained by Mr. Gayley, yet "it may remain to attain this end by a method less complex."

*Abstracted from *Proceedings* of the American Institute of Mining Engineers, May, 1905, p. 568.

Spitzbergen Coal.

According to statements in Norwegian newspapers, the coalfields of Spitzbergen, after experimental mining in previous seasons, have been found of sufficient value to justify more extensive operations. An expedition has been fitted out at Sheffield, England, in which also some Norwegian capital is invested, and the leader has arrived at Trondhjem, where he is hiring men and buying provisions. About 70 men are engaged. It is the intention to erect 11 buildings, to be brought over ready-made, and when set up to be used for lodgings, sheds for machinery, etc. The larger part of the machinery is to be brought from England. The expedition will start from Trondhjem in May.

There is said to be an excellent harbor near the mines. A wharf will be built and connection made by a wire tramway with the mines, which are located at some elevation on the mountain. It is thought that the summer season will pass in making preparations, and that but little actual mining will be done before the winter sets in. After the shafts have been sunk, cold weather will not present any serious obstacles to the work. The capital invested is about $150,000 for this preliminary work.

The standard Clark cell has an e. m. f. of 1.4329 or 1.434 volt at 15° C.

The electric furnace seems to be adapted to the commercial production of the ferro-alloys carrying tungsten, molybdenum, vanadium, etc.

New cases of the mine-worm disease (ankylostomiasis) are reported from the Kolar goldfield, and disinfection of the workings has been employed in the infected district.

The progress of wireless telegraphy is marked by the achievement of the Cunarder, *Campania.* When in mid-ocean, on May 23, 24 and 25, 1905, she was in communication at the same time with both sides of the Atlantic, the results of which appeared in the *Daily Bulletin,* published on board by the purser, Mr. Graham. The Marconi land-stations were at Cape Cod, near Boston, U. S. A., and at Poldhu, England. The marconigrams were strong and clear, and a complete Atlantic transmission is now next on the list of the expected.

The Cumberland Gap Coalfield.

The following notes on this little-known field are from an interesting monograph by J. C. Tipton, recently published:

The southern end of the field is in Campbell county, Tennessee, and Bell and Harlan counties, Kentucky, extending along the southeastern border of the latter State. It is an almost enclosed basin, but within the bounding ranges the Black and Log mountains rise to elevations of over 3,000 ft. in narrow-crested and irregular ridges. In shape the valleys just about duplicate the ridges, though in reversed position, being usually 2,000 ft. deep and narrowly V-shaped. Only the Cumberland and its main tributaries have any bottom lands, and these are usually limited. East of Middlesborough they have easy grades and the other conditions are favorable for the building of railroads. The rocks lie in the form of a nearly flat-bottomed syncline or trough, with the sides turned up at high angles. The axis or lowest line of the trough lies well to the northwest of the center line of the basin, and from this axis the rocks rise toward the sides at about an average rate of 100 ft. to the mile. When within one-half to two miles of the edge of the basin the rocks are upturned sharply at angles of from 30 to 90°. As the lowest part of the basin lies close to the main drainage line and the slope of many of the streams just keeps pace with the dip of the rocks, the lower coals are exposed along much longer lines of outcrop than would otherwise be the case, while nearly all of the coals lie well for draining. In most cases the dip is such that easy haulage will be toward a point most easily reached by a railroad switch. The upturning on the northwestern edge of the field is associated with a great fault running in a northeast-southwest direction. Fork mountain, across the southwestern end of the basin, is due to the upturning of the same rocks by a fault similar to the Pine mountain fault, except that it is transverse in direction. The upturning in Cumberland mountain marks part of the northwest limb of the Powell valley anticline, the axis of which lies near Powell river in the Great Valley.

The coal-bearing rocks of the field consist of sandstones and shales, having a total thickness of about 4,000 ft. According to the evidence of the fossils, all of these rocks are of the same age as the Pottsville rocks of Pennsylvania. The lower third of the series is predominately sandy, containing many massive sandstones and conglomerate beds. While this part of the section contains some coals, one or two of which may be of workable thickness, under all of the central part of the field, where the strata lie well for mining, these rocks and their coals are well below drainage. On the edges where they are above drainage, they are dipping at high angles and the coals, as far as seen, are usually more or less crushed. While of less value than the other coals of the basin, they constitute an important reserve supply. The upper two-thirds of the section contain about equal amounts of shale and sandstone.

The Log mountain section shows some 50 coals, of which about seven are now being worked commercially along Bennett fork of Yellow creek. Of the others at least five are workable over all or part of the field. The beds being worked will carry on the average from 4 to 6 ft. of workable coal, but as all of the coals are more or less broken up by partings, the total thickness of the seams is often quite a little more. While these partings make the coal easier to mine, they also increase the percentage of ash in the coal as shipped. In some cases the partings are quite variable, ranging from zero to 4 ft. in one mine. In other cases the partings are fairly persistent over large areas, so that to some extent they may assist in identifying the seams. In much the same way the coals range from regular to pockety in thickness. Most of the thicker coals appear to be fairly persistent, some of them being recognizable and workable over practically all of the area within their outcrop. Others, as the Mingo seam, while workable over part of the field, become unworkable elsewhere, either through splitting up or thinning out.

Much the same conditions exist in the Black mountain part of the field, though the number of persistently workable beds appear to be less. This difference may be more apparent than real, owing to present lack of knowledge of the coals, while on the other hand the workable Black mountain coals occur lower in the series, thus being nearer drainage and underlying comparatively larger area, and the workable portion of the coal is in some cases without partings over large areas. Thus the Harlan coal maintains a thickness of 4 ft., usually without partings, over most of the part of Harlan county in this basin, an area of 100 or more square miles. In the same way the Wallin creek coal, though limited in area, frequently shows one bench of from 5 to 7 ft. without partings. The coal of the upper two-thirds of the section is all above the principal lines of drainage, but will vary from just above drainage to 2,000 ft. above. The Harlan coal is usually less than 400 ft. above drainage, the Mingo coal usually less than 600 ft. above drainage, and both pass beneath drainage in the upper reaches of the streams. Correspondingly the area underlain by each seam depends on the elevation, the upper ones usually underlying very limited areas. The quality of the coals of this district is well indicated by the following analyses; the first is averaged from a large number taken in the Black mountain part of the field in 1902 and 1903 on the Harlan coal. The sampling in all cases included the whole seam, except the larger partings, such as would be excluded in practical mining: Water, 1,972; fixed carbon, 54,691; volatile hydrocarbons, 37,552; ash, 4,992; sulphur, 0.793.

The second is an average sample of one of the coals being mined in the Log mountains: Water, 4.40; fixed carbon, 56.60; volatile hydrocarbons, 32.80; ash, 5.38; sulphur, 0.82.

A comparison of these analyses with those of coals in other fields shows that they have almost exactly the same composition as the Westmoreland gas coals, the Pennsylvania gas coals and the Clinch Valley gas coals. While the coals are not strictly coking coals, that they may be successfully coked is best attested by the coke ovens at Mingo and in the Big Stone Gap field, which is really a continuation of this one. As mined west of Middlesborough, most of the coals have proved rather friable, mining readily without powder and making but a small percentage of lump over 4-in. bars. On account of the partings, it has been found desirable at Mingo to wash the coal used for coking.

As a whole, this must be considered a virgin field. It is less than 15 years since it was first opened up, and though it is now producing close to a million tons a year and rapidly increasing, operations are practically confined to two branches of one creek, Bennett and Stony forks of Yellow creek.

In mining, the room-and-pillar method is used exclusively. In the past little use has been made of modern mining machinery, largely on account of the ease of mining. Fans are now used for ventilation, and the present indications are that in the near future much of the working and handling of the coal will be by modern machinery. In 1902 all haulage was by mules, the coal being brought to the headworks, where the mine cars are usually dumped into large 'monitors,' and in these the coal is sent down the incline to the tipple. The inclines range up to 600 ft. in vertical descent. The miners in this section belong to several nationalities, and are not organized into unions.

At the present time most of the coal produced in the field goes directly to the railroads. The coke supplies the local furnaces at Middlesborough, the Ducktown furnaces and elsewhere. A growing market is being found in the mills of the Carolinas and Georgia.

Good cement should show a breaking strength of 350 lb. in 7 days, and 500 lb. in 28 days.

Some of the old Roman hydraulic cement was harder than the brick bound by it; the brick has worn away, leaving the cement projecting on the edges.

Theoretically, 131 electric horsepower-days (of 24 hours) would make 1 ton of iron from 65% ore; but Swedish practice showed that 362 electric horsepower-days were required.

Compulsory Arbitration.

BY F. DANVERS POWER.

Australia is, in many respects, a fortunate country. It covers a large area, offering great variety of climate and soil, and possessing mineral deposits of every kind. With the exception of a few harmless aboriginals, this island continent is populated by white races under British rule; there are no foreign neighbors on the mainland to raise boundary disputes; even the wild animals are not of that savage nature found on other large tracts. Notwithstanding these, and other, advantages, Australia is not such a desirable country to live in as one would expect, for the reason that those responsible for making our laws have made grievous blunders. The labor politicians are numerically in the minority, but too often they hold the balance of power, and so succeed in passing certain bills to further their ends, the avowed aim of which is communism, which, so long as human nature exists, means that the industrious man works for the loafer. Australians, or that portion of them that went to South America a few years ago to form the colony of New Australia, found out to their cost what communism meant before they finally broke up.

The attitude of the labor party has done more than anything else of late to drive capital out of the country, and to prevent fresh capital from coming in. The action of the 'laborites' in most cases is due to their ignorance of history and the elements of political economy. Their desire to increase the sum of human happiness is commendable, but the way they propose to do it is likely to defeat their object. Private enterprise is discouraged, while freedom and justice are doomed, and there is no stimulus for a man to do his best so long as good and bad workmen are to have a uniform wage. The result must be that, though wages may become higher for a few, the older, weaker and slower persons will be thrown out of work; and, as they cannot be allowed to starve, it means that the workers must keep them; this will take more than the extra wages they earn to keep so many in idleness, and this will be aggravated by the fact that money will not have the same purchasing power, while our markets will be limited and our production reduced. As capitalists will not lend money to such people (for, working on an unbusinesslike basis, there will be little chance of getting it back), the tax-payer will have to find the wherewithal to keep up this huge experiment; this will result in driving the intelligent and energetic Australian to other countries, where he will meet with suitable reward, and Australia will only be able to boast of what she might have retained. The incentive to work having gone, production will diminish and the standard of living will necessarily fall.

In New South Wales an Arbitration Act came into force in 1902, which was to run for six years as an experiment. Three years have passed, and so far its effect may be looked upon as a dismal failure. Though applied to all industries, yet mining being one of the chief of these, it has been correspondingly affected. Sir Frederick Darley, the Chief Justice of New South Wales, during proceedings before the Full Court, in an appeal matter from the Arbitration Court, summed up as follows:

"It is also beyond question that the Arbitration Act, as in force in this State, is an Act which is in derogation of the common law; it does encroach upon the liberty of the subject as regards persons and property; it creates new crimes unknown to the common law, or contained in any previous statute. It interferes with the liberty of action of both employer and employee. It precludes the one from giving, and the other from obtaining, employment except on terms imposed by the Act, and it can prescribe terms of management which, however injurious they may be to the employer, he must comply with under penalties for any breach of the order of the court. There are many other matters to which I might refer, such as the operation of the common rule upon persons who have not been before the court; but it is not necessary to do so. Further, I think this Act is productive of the most alarming and deplorable amount of litigation, with its concomitant ill-feeling and ill-will between employers and employees, who are by this Act forced into hostile camps. I believe the object of the Legislature, in passing this Act, was to promote peace and goodwill between employers and employees, but I fear it has not done so."

It seems absurd that such a far-reaching Act should be put into force as an experiment without those responsible for it making exhaustive investigation. The want of foresight in this, and other, cases causes one to lose confidence in the ability and judgment of the majority of our politicians. The labor party ignores the law of supply and demand, and forgets that labor is not the only factor in wealth-making. With labor alone we would be no further advanced than savages of the stone age.

The Arbitration Act was intended to prevent strikes, but it has gone beyond the purpose which it was expected to serve, with the result that nearly 120 industrial disputes were filed with the registrar for arbitration since the court has been in existence, and 60 of these are still on the file waiting to be heard, several of which were lodged during 1902. As soon as the Act came into operation, there was a rush to get wages raised, whether the trade could stand it or not; many disputes were filed that would never have cropped up in the ordinary course of events, while others would have been settled by a meeting of employers and employed; but instead of using voluntary arbitration to effect conciliation, compulsory arbitration is in force, that gives satisfaction to neither side. The transference of the management of private business from the owners, and vesting it in a court that cannot possibly understand all the details of the various trades it has to deal with, has resulted in much confusion. The Arbitration Act is a one-sided law. As long as judgment is given in favor of the employed, they are satisfied; and should the employer make a breach of the award he can be punished by a fine, or, in default, his plant and machinery may be seized by the court. When the judgment is against the employed, they threaten to apply to the High Court, and if that fails they will invoke the aid of the State Legislature to alter the Act, and as a last resource they are prepared to organize a vast industrial strike. The court is practically powerless to enforce its decision against the unions, for in many cases they have no funds to attach, and when they happen to have money the officials publicly repudiate the acts of its members while privately encouraging them. All that can be done, then, is to prosecute the men individually and deprive them of their liberty; but this again is not feasible, for there is not a jail in the country large enough to hold all the strikers. If only a few were imprisoned it would be unjust, and would serve no good purpose, as they would be regarded as martyrs. The Act has not caused strikes to be things of the past, as proved by the Teralba affair: the colliers claimed increased rates for hewing coal, but the award was given against them, with the result that they struck. Moreover, the court held that the miners were quite within their rights by striking, as the award, though regulating the condition of labor, did not say that the men must work. Not only do the miners strike when they wish, but the New South Wales miners levied and collected the sum of £20,000 in one year to assist the Outtrim strikers in Victoria. That some gave against their will was proved by the fact that one man was driven to the expense of testing the legality of the levy in the court.

In the case of the Colliery Employees' Federation against the Northern Colliery Proprietors' Association, the employees not being satisfied with the award, 250 boys struck work; this threw from 5,000 to 6,000 men out of employment. They could not be forced to resume work, as the Arbitration Court is given no power to enforce it. The Arbitration Court does not even settle disputes quickly, for not counting those that have to stand over by reason of the congested state of business, the case of the Australian Workers' Union, said to number over 21,000 members, against the Machine Shearers and Shed Employees' Union has dragged for three years, and is still in progress; it is likely to last for many more months.

At first those employers and employed who wished to come to effective and early agreements took advantage of the voluntary industrial agreement, and this was made a common rule of the trade to which it applied, non-associated persons who refused to fall into line being given leave to move for exemption. The High Court, however, held that the common rule could be applied only to an award of the court, which means much delay in order to get the advantage of the common rule. The unionists, in order to secure advantage over non-unionists, fought hard to obtain preference, and the Arbitration Court ordered that, when reasonably practicable, according to the exigencies of trade, employers shall notify the unions when they require labor, so that unionists could be the first to apply for work. The Full Court, however, decided that the Arbitration Court had no power to do more than carry out the exact words of the statute, which did not state the above, so the 'preference to unionists,' the chief inducement held out to others to join their ranks, has been taken from them. One union, in order to confine work to those then members, actually closed its books to men who wished to join and share in any advantage the union might offer.

The number of applications to the Arbitration Court, which affect thousands of workers and large amounts of capital, indicate the extent of industrial unrest in New South Wales. Many of the difficulties that have arisen have been caused by the Arbitration Act, which is having just the effect opposite to what was intended; and when one considers the discontent, time, money and energy that have been spent over the working of this piece of legislation, it is questionable whether, after all, more mischief has not taken place than if men had actually struck in the old-fashioned way. The workmen of Great Britain and the United States of America show their good sense in voting against compulsory arbitration.

In solid blocks of concrete, the ratio of filling (ballast) to cement should not be above 6 to 1; for hollow blocks, not over 4 to 1; and for facing material, not over 2 to 1.

Oil or fat exerts a most destructive influence on portland cement. The result shows in coarse cracks, weakening and even disintegrating the mass, in the course of one to several months.

The wires in the main cables of the Williamsburg bridge over the East River, New York, were protected from rust by being first coated with heavy oil and graphite, then wrapped between cable bands with cotton duck saturated with a waterproof compound. The whole was finally covered with a shell of sheet-steel fitted between the cable bands in halves, and strapped together so as shed water.

Some Suggestions on Shot-firing.

In view of recent discussions, the suggestions, made by A. L. Hayden, of Weir City, Kan., to the Kansas Commission on accidents in coal mines, appear timely and interesting. We give below the letter, taken from the report of the commission:

"I am a firm believer in the value of a daily and thorough wetting of all dry mines. The tendency of this to lessen the danger of explosion, by getting rid of the inflammable coal dust, will probably be admitted by all. I also believe that the great majority of explosions in the Kansas district are caused by rapid firing of shots—filling the mine with smoke and coal dust, thereby creating just the right conditions for a 'windy shot' to touch everything off. I believe firmly that slow firing and a good, strong circulation of air would materially lessen the danger, though admitting readily that there have been a few explosions which cannot be charged to rapid firing. The value of slow firing will probably be admitted by all (except the shot-firers, who want to earn a big day's wages in one or two hours' time). I am aware that I belong to the minority side in advocating a strong circulation of air, and mention the matter from no desire to argue the question, but because of its bearing on the second suggestion I shall make.

"My first suggestion is caused by the fact that in our recent explosions several men met death wholly from suffocation, being neither mangled nor burned. The firemen of New York and other large cities are now equipped with means for carrying with them a supply of fresh air, compressed, so that they can enter a building filled with smoke without danger of suffocation. If these shot-firers had been equipped on the same principle, but with a modified appliance, they would have walked out unhurt after the explosion. A pocket electric bulb, as part of the equipment, would furnish the light, if wanted, though any miner could make his way to the bottom in the dark. Such an equipment would be something of a nuisance to carry, yet not cumbersome. The cost to the operator would be small, and there should be enough extra equipments to fit out a rescue party.

"My second suggestion, however, is to do away with shot-firers altogether, eliminating all loss of life and, I believe, 99% of all explosions. This can be accomplished through firing from the top by electricity. There is no question as to the physical possibility of it—it is simply and solely a question of expense. At first glance it would seem, in view of the purchase and maintenance of the miles of insulated wire required, that this would be prohibitive; but, while admitting that I have not yet gathered the data nor made the estimates necessary to furnish a basis for a positive statement, I am of the opinion that the expense will not exceed the cost of the present system of shot-firing. Take the case, for example, of a mine employing two shot-firers and a night watch. The shot-firers, at $2.83 per day each, would be replaced by one day-man to look after the wiring at a cost of $2.42, leaving $3.24 per day to reimburse the operator for the cost of wire. The miner today furnishes his own fuse. He should pay for the wire used daily in his shots, either in whole or in part—a detail to be settled by agreement between the operators and miners. If he paid for it in whole, the operator would have to pay for the wires from the top to the mouth of the room. The sum saved on shot-firing in a new mine would be much in excess of the daily cost of wire; but this cost would continually grow greater as the mine developed—just as the hauling cost does. The average would probably make the cost about the same as the present system of shot-firing; but even if it were greater, the cost would adjust itself in the price of coal, just as the shot-firer's wages did.

"When it comes to firing the shots, the night-watch would do it and no extra man would be needed; and in the time which could be consumed in firing would lie the operator's greatest safety to property. Shots could be fired just so many minutes apart, and in different parts of the mine, so that there need never be an accumulation of smoke and dust to provide the conditions for an explosion. In a large and dangerous mine the firing could be extended over 12 hours' time, if deemed advisable; the operator could determine the time, as there would be nothing at stake, except his property. With 350 men in the mine, and an average of two shots to the man, there could be a full minute between every shot; and by firing shots first in one entry and then in another there could be 10 or 15 minutes between shots on any one entry—time enough for a good strong air current to carry away all smoke and dust from the previous shot. A man could have three or four shots in his place, if wanted, and they could be fired an hour or two apart—long enough to eliminate all danger (from explosion) in the deadest part of a mine, provided the fan is speeded instead of slowed, as is generally done now.

"There seems no way under the present system to make shot-firers take the time necessary for safety in their work. If they hurry through it, well knowing their lives are at stake, it is useless to talk of any other penalty. But with electric firing, and one man to do it, the operator could take all the time he deemed necessary for the work. A clockwork record could be easily attached to the keyboard, showing not only the exact time between shots, but also the exact time each individual shot was fired. In the event an explosion should occur, this record would also show whose shot caused it.

"This electric firing would put a stop to loss of life. As I said before, I am of the opinion the cost would not exceed

our present system. In small mines the daily cost of wire would be small; so would the saving on shot-firers' wages. In large mines, employing six or eight shot-firers, the cost of wire would be pretty heavy, and the saving in wages would be correspondingly large. But suppose the cost was very materially greater than the present system, the game is worth the candle. The present shot-firing law imposed a cost upon the operators ranging all the way from $1,000 a year for the little fellows to $50,000 a year for the big companies. Yet no one questions the wisdom of a law which put a stop to the wholesale holocaust of miners or would see it repealed; and if a law requiring electric firing went into effect, and added further cost to the operator, the saving of life would justify it and public opinion uphold it. As for the operator's pocketbook—well, when the shot-firing law was passed he simply handed on to the consumer the extra two or three cents per ton it cost; and if electric firing was compulsory he would figure in the added cost, if any, in making his price-list.

"There would be some difficulties in inaugurating a system of electric firing, which did not arise when the shot-firing law was passed; and allowance should be made for them. A reasonable time should be given for operators to instal the system, and mines nearly worked out should be exempted—the cost would be prohibitive to them. Perhaps the law should apply only to mines opened after its passage. or to those where the percentage of coal worked out is yet small; it should certainly be fair and equitable to all. Aside from the matter of justice, prudence would dictate a fair law, for one imposing an unreasonable expense on mines developed prior to its passage would not be sustained by the courts."

. On a recent contract for 30,000 barrels of cement for use in the Philippines, the lowest bid received was from a Japanese company, which secured the contract. The contractor is the Mitsui-Bussen-Kaisha, and the price is $3.90 per barrel for 'Onodo' cement, deliveries to be made alongside ship, Manila bay, at the rate of 5,000 bbl. per month.

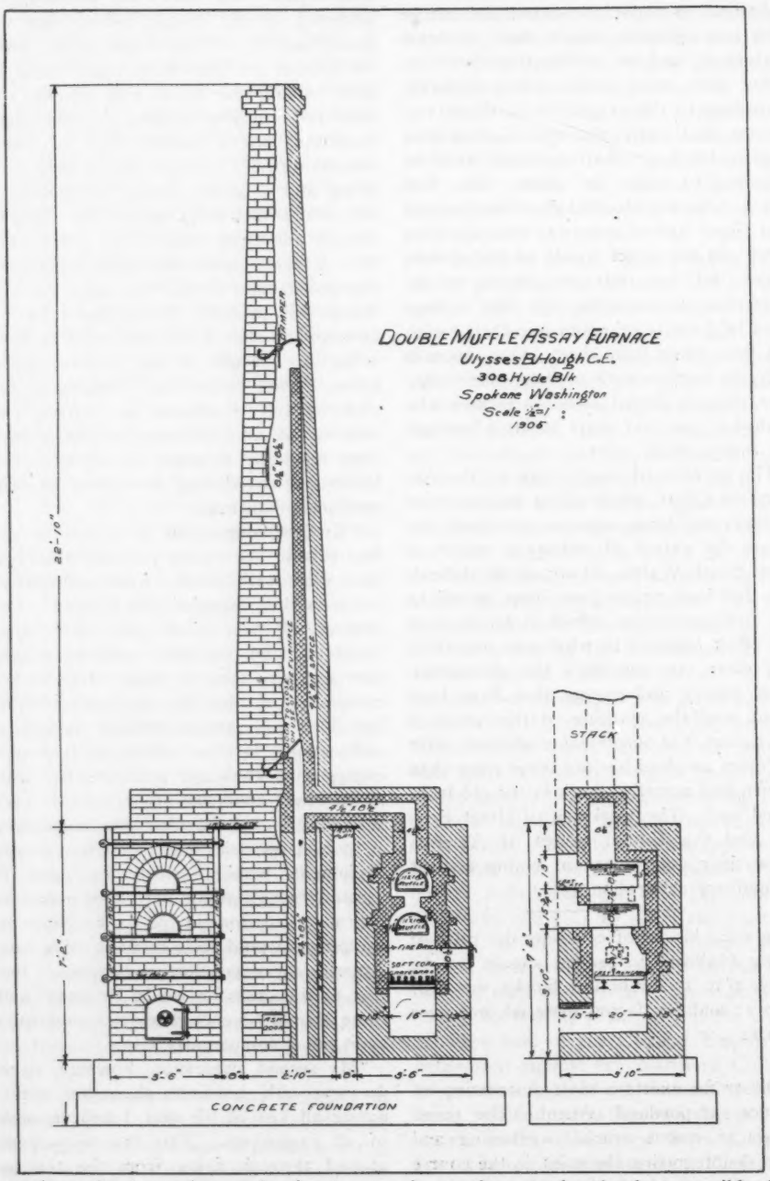
As a result of experiments with the process of Messrs. Eschweiler & Wolterеck for utilizing peat for the production of sulphate of ammonia, $150,000 is now being spent on a complete recovery plant in the peat lands of Carnlough, Antrim county, Ireland. While the drawback to the use of peat as an industrial material has hitherto been the difficulty and expense of freeing it from its inherent moisture, it is claimed that the presence of up to 50% of moisture is a positive advantage in the new process, and that there is a recovery of 68% of ammonia in the form of the sulphate, which is a valuable fertilizing agent.

A Double-Muffle Assay Furnace.

BY ULYSSES B. HOUGH.

The accompanying plan shows a superimposed double-muffle assay furnace used by some of the lead-silver mining companies of Washington and Idaho. One of these furnaces had been in constant service for the past seven years, giving excellent results. Two furnaces were built, one on either side of the stack, only one being used at a time, each being large enough to do the entire work of a large mine. The furnace, when once started, is used from day to day until burned out, lasting from 19 to 22 months. The second furnace is then started while the first is being repaired. By building double, one furnace can always be ready. The repairing of a furnace requires the labor of a mason and helper from two to two and a half days. The stack, while it has been in constant use since 1898, has not required repairing and from appearances will run for a long time to come.

The fuel used is soft coal. The consumption ranges from 175 to 250 lb. per day and the assays made will range from 75 to 150 of lead and silver. Coal at $5.75 to $6 per ton will make the cost of fuel low. This furnace can be brought to a proper heat for work in 45 min., but two hours are usually taken. The drawing plainly shows all dimensions and should be closely followed, as experience has shown these to be the best possible for burning soft coal.



The grate-bars are of cast iron, as well as all doors, which are lined with cast plates perforated by ½-in. holes. The lining only is replaced from time to time. The outside should be securely stayed, as shown. The rods are to be made with nut in one end and an eye on the other. In this furnace both muffles heat alike, work being done in one as well as in the other.

Improved Slag Treatment.*

BY HAROLD V. PEARCE.

Mr. Pearce describes the changed conditions at Argo (which is a suburb of Denver, Colo.), where the decline of copper of several years ago, together with the dwindling of the copper ore supplies, has necessitated better saving and closer economy in treatment.[1] One promising improvement lay in the direction of reducing the losses in copper, silver and gold in the slag. The slag was formerly classed as 'clean' and 'foul,' and these were roughly separated. The method was to treat the mixture of foul and clean slags with a modicum of 'clean pyrite,' subsequently allowing the mixture to remain quiescent at a fairly high temperature for a short time; the result being that a small quantity of low-grade matte was precipitated to the bottom of the crucible, and the superimposed residual slag was left 'clean.'

With this line of attack outlined, "a small auxiliary reverberatory furnace" was built for each of the large reverberatory furnaces, in which small furnaces the foul slags were cleansed, the slags being tapped directly from the large to the small furnace. An adjustable movable slag-launder or skimming-spout led the slag from the large ore-furnace to the small cleansing furnace. The flow takes place almost automatically, resulting in a large saving of labor, rabble iron, soap for lubrication, etc. The application of such a simple device may not be novel, but it is given as an intimation of what can be done by substituting the auxiliary furnace for the old expensive process of skimming a wasteful slag. "In the practice at Argo there has been a considerable decrease in the tenor of the matte resulting from the cleaning of the slag furnace since the tapping method has been adopted.

"The method of cleaning the slag is as follows: The large ore-furnace being ready for skimming, the spout is lowered in position, which connects it to the small auxiliary slag-furnace. The slag-furnace fireman stands ready to direct the flow of slag on to the hearth of the latter. The two side skimming-doors of the ore-furnace are removed, and four skimmers take turns at the skimming-rabbles, as before stated. After all the slag has been removed from the ore-furnace, that portion which became chilled in the spout is at once pushed into the slag-furnace and the door closed. The fireman then stokes the fire of the slag-furnace and maintains a moderate heat for about an hour, which suffices to melt the 'spouts,' as the chilled slag in the spout is called. The side door is then raised and 1,000 lb. of sulphide, usually in the form of 'tailing,' is sprinkled evenly over the surface of the liquid slag. More heat is then applied and the settling and cleansing period begins, continuing for two hours or more, according to the requirements of the ore-furnace. It will be noted that the slag is *tapped* (not skimmed) from the slag-furnace after it is cleaned, the hearth being built to slope rapidly toward the matte tap-hole, and the slag tap-hole being placed a short distance away at a slightly higher level. The level of the matte underneath is easily determined, and the slag is tapped almost down to this level. A 'bay' or dam, consisting of clay and sand, is built up in the slag tap-hole of the slag-furnace, as the matte accumulates on the bottom, and the level of the slag rises in proportion. When ready to tap the slag, the temperature of the furnace is slightly raised and the slag-furnaceman tears down the dam gradually by means of an iron hook almost to the level of the underlying matte, an action which allows the slag to flow out into sand molds conveniently placed to receive it. The slag tap-hole is then built up again with sand, and the furnace is ready to receive the next skim from the ore-furnace. After treating about 20 skims of slag in this manner, the slag-furnace contains 4 to 5 tons of low-grade matte, which is then tapped through the matte tap-hole in the ordinary manner; but, before letting out this matte, the small quantity of slag remaining on its surface (which is always left behind as a safeguard against the escape of small quantities of matte at the end of each outflowing of slag) is skimmed through the front door of the furnace.

"In describing the operating of the slag-furnace, it will be noticed that I have always used the terms 'skimming' and 'skims' in referring to the slag tapped from the ore-smelting furnaces; and in this connection a point arises which I judge is of great importance to those using reverberatory furnaces in lieu of, or in addition to, blast-furnaces.

"It had long been a cherished hope that, some day and somehow, the laborious and somewhat painful process of skimming by the hand-manipulation of the venerable rabble might be dispensed with; but, for a long time, we were never able to summon up sufficient courage to try any of the several methods which have occasionally suggested themselves. The experience gained in operating the auxiliary slag-furnaces, however, furnished the necessary encouragement. The art of building up the bay or dam in the slag tap-hole of the small slag-furnace, and the control of the outflow of slag therefrom, having been mastered, a fairly safe basis was thus afforded on which to attempt to regulate the flow of the slag from the large ore-smelting furnaces; moreover, the certain knowledge that any matte which might escape in the flow of slag from the ore-furnace would be caught by the auxiliary slag-furnace removed any anxiety concerning the result of the trial so far as losses were concerned. The trial made on one furnace was so eminently satisfactory that skimming, so far as the large ore-furnaces are concerned, has been discontinued.

"Practical smelting men will appreciate the full meaning of this method of tapping slag when it is noted that lately at three large ore-furnaces the smelting of the respective charges had become finished at the same time; in other words, the slags of the three furnaces were ready to be skimmed or tapped at once. Although this occurrence is unusual, if it had happened under the old skimming system, especially in hot weather, general despair and pandemonium would have resulted. Under the new conditions, however, two slag-tappers handled the three furnaces with perfect ease, casually strolling from one furnace to another, and keeping an eye on the outflow of slag."

*Abstracted from *Bulletin* of the American Institute of Mining Engineers, May, 1905, p. 597.

[1] It will be remembered that the Argo plant makes a matte which is subsequently treated for silver by the rather unusual Ziervogel process, followed by a carefully sequestered gold treatment.—EDITOR.

The cost of production of iron and steel is made up of four main elements—raw material, fuel, labor and transportation. These are all so involved that it is not possible to establish a profitable iron industry unless all can be had at a reasonable cost.

The method of carrying out in practice the principle upon which the modern process of zinc smelting is based, was discovered in Silesia about 1799. About the same time a practical method of zinc smelting was discovered and put in operation in Carinthia. A similar discovery was made in Belgium, in 1805, by Dony, who did not know of the work done elsewhere, but devised his process independently.

In his recent address at Cleveland, Arthur Warren discussed the subject of 'publicity' at length, and in the course of his remarks, expressed himself as follows: "Publicity is an earning power. But the manifestations of this power have hardly yet begun. We have to make them so strong and fruitful that they will force themselves upon the attention of the manufacturing world in a way that even yet they have not done. There is so much more to do. We have to educate the manufacturing world to regard publicity as a revenue earner, not as a mere expense. Some manufacturers when hungry for business cut down their publicity expenses—cut down one of their means for making sales! When business is flourishing they say they do not need publicity; their shops are full of work. You remember the story of the Irishman's leaky roof. Pat couldn't mend the roof in rainy weather and on fine days it didn't need mending. Evidently we have some missionary work to do."

Standardization of Screens.

The Institution of Mining and Metallurgy, London, by Mr. Walter McDermott, the chairman of one of the committees on standardization, has sent out the following circular:

In referring to wire-screen mesh it seems desirable as a first step to adopt one uniform basis of measurement; and established custom would seem to justify a general agreement in using as a standard the number of holes per lineal inch, measuring from center to center of the wires. It is suggested that if a standard of equal number of holes each way be aimed at (as certainly is desirable), there is no need to describe a screen of, say, 100 mesh as a 10,000-mesh screen, and at present both descriptions are in use. While no actual confusion may result, uniformity is advantageous, and figures of mesh—with frequent use—become representative in the mind of certain mentally recognized sizes. The smaller figures for the lineal inch are one distinct advantage, and they are derived directly from a single measurement, while the larger ones are a product of calculation following measurement, and give no greater accuracy of definition.

It is generally known that the number of mesh to a lineal inch does not clearly define the size of opening. Owing to great variations in the thickness of wire in different screens it is always necessary (if anything approaching accurate definition is required) to give either the gauge of the wire, or the actual measurement of the opening between wires. From this it has been sometimes urged that the use of the number of mesh should be dropped entirely, and only measurement of openings should be given. This is logical and would secure the exactness aimed at, but it raises several questions of a practical nature when examined as to its application. There is no difficulty in the measurements of openings in a screen down to, say, 1-32 in., but the important function of mesh, as usually employed, is in connection with openings much finer than this. The grading is necessarily done by wire screens, and if some uniformity in these can be established, comparative results are reached more readily than by attempting corrections for variation in size of opening expressed in three or four places of decimals of an inch. For instance, if two engineers in opposite parts of the world are comparing the percentage of their crushed product which passes a 60-mesh screen, it is undoubtedly simpler that they should both use a screen with agreed openings of, say, 0.0075 in., rather than attempt to compare results by means of the ratio of, say, 0.0067 in. and 0.0107 in., which they may find to represent the openings of 60-mesh screens used by them respectively.

If it be admitted that screens are best described by their mesh numbers, and that it is desirable to associate this mesh number with a fixed thickness of wire for uniformity, then the existing well-understood system remains unaltered. The use of the mesh number has incidentally the advantage, that by actual use a screen of a given mesh, suppose 40-mesh, does represent a fairly definite maximum size of particle of ore to engineers; whereas, a 0.0124-in. opening represents nothing to the minds of most people. It would seem from the

SUGGESTED TABLE OF STANDARD SCREENS FOR LABORATORY USE.

MESH		WIRE GAUGES		DIAMETERS OF WIRE.		SIZES OF APERTURES.	
PER SQUARE INCH.	PER LINEAR INCH	IMPERIAL STANDARD ENGLISH.	WASHBURN & MOEN MFG CO'S AMERICAN	IN DECIMALS OF AN INCH	IN MILLIMETRES.	IN DECIMALS OF AN INCH	IN MILLIMETRES.
64	8	17	—	·056	1·4224	·069	1·7526
		—	17	·054	1·3716	·071	1·8034
100	10	18	—	·048	1·2192	·052	1·3208
		—	18	·0475	1·2065	·0525	1·3335
144	12	20	—	·036	·9144	·0473	1·2014
		—	20	·0348	·8839	·04853	1·2326
196	14	21	—	·032	·8128	·03943	1·0015
		—	21	·03175	·8064	·03968	1·0079
256	16	—	22	·0286	·7264	·0339	·8610
		22	—	·028	·7112	·0345	·8763
324	18	—	23	·0258	·6553	·02976	·7559
		23	—	·024	·6096	·0316	·8026
400	20	—	24	·023	·5842	·027	·6858
		24	—	·022	·5588	·028	·7112
484	22	—	25	·0204	·5182	·02506	·6365
		25	—	·02	·5080	·02546	·6467
625	25	—	26	·0181	·4597	·0219	·5562
		26	—	·018	·4572	·022	·5588
784	28	—	29	·015	·381	·0207	·5258
		28	—	·0148	·3759	·0209	·5309
900	30	—	30	·014	·3556	·0193	·4902
		29	—	·0136	·3454	·01973	·5011
1225	35	—	32	·0128	·3251	·01577	·4006
		30	—	·0124	·315	·01617	·4107
1600	40	—	33	·0118	·2997	·0132	·3353
		31	—	·0116	·2946	·0134	·3404
2025	45	32	—	·0108	·2743	·01142	·2901
		—	34	·0104	·2642	·01182	·3002
2500	50	—	34	·0104	·2642	·0096	·2438
		33	—	·01	·254	·01	·254
3600	60	—	37	·0085	·2159	·00816	·2073
		35	—	·0084	·2134	·00826	·2098
4900	70	—	40	·007	·1778	·00729	·1652
		37	—	·0068	·1727	·00749	·1902
6400	80	38	—	·006	·1524	·0065	·1651
8100	90	39	—	·0052	·1321	·00591	·1501
10000	100	41	—	·0044	·1118	·0056	·1422
22500	150	45	—	·0028	·0711	·00386	·098
40000	200	47	—	·002	·0508	·003	·0762

NOTE:—

MILLIMETRE COLUMNS: WHEREVER THE FIFTH DECIMAL WAS 5 AND OVER, 1 HAS BEEN ADDED TO THE FOURTH DECIMAL. IF THE FIFTH DECIMAL WAS UNDER 5 IT IS OMITTED ALTOGETHER

INCHES TO MILLIMETRES ALL CALCULATIONS - INCHES TO MILLIMETRES ARE BASED ON :- INCH × 25·39954 = ONE METRE AS ADOPTED IN THE ACT OF 1878 (ENGLISH.)

WIRE GAUGES: THE "IMPERIAL STANDARD WIRE GAUGE" CAME INTO OPERATION MARCH 1ST 1884 BY ORDER OF THE COUNCIL AND IS NOW THE LEGAL STANDARD. NO OTHER GAUGE FOR WIRE OF ANY METAL IS IN USE IN ENGLAND.

AMERICAN GAUGES: THE AMERICAN WIRE-CLOTH MANUFACTURERS HAVE ADOPTED THE WASHBURN AND MOEN MANUFG CO'S GAUGE FOR STEEL AND IRON WIRE ONLY. THE "OLD ENGLISH GAUGE" IS USED FOR ALL WIRE-CLOTH WHICH IS MADE OF BRASS, COPPER OR BRONZE WIRE. THE SIZES OR GAUGES OF WIRE GIVEN IN THIS TABLE ARE THOSE USED FOR STEEL AND IRON WIRE ONLY.

above that it is desirable: (1) To retain the use of the term 'mesh' of screens, on a basis of the lineal inch, for grading of particles smaller than 1-16, or, perhaps, 1-32 in. (equal to, say, 8 or 14 mesh); (2) to insure uniformity as far as possible by use among engineers of a standard thickness of wires; and (3) to note any departure from the standard by stating the gauge of wire or size of opening in the screen employed.

In selecting a standard it is chiefly important to have a gauge of wire for each screen which shall be readily obtainable from makers, heavy enough to give good service, and therefore approximating to general practice in actual mill work. As it is easier to obtain criticisms of a given suggestion than to secure suggestions themselves, the attached table is offered as a first attempt in the collection of opinions on the matter.

It will be understood that the establishment of a standard such as that suggested is merely for laboratory use, to introduce uniformity in reports and comparison of results among engineers, and does not refer to the use of screens in mills in actual working, which must depend on a variety of conditions not appertaining to laboratory work.

It will be noticed that the number of screens given is much smaller than the number manufactured. This is intentional, as it seems desirable to prevent an unnecessary number of sizes in classification; and there seems no reason why engineers, in agreeing on a standard of openings, should not agree to use the same gradation of classes. Refinements of classification beyond a certain point are neither instructive nor practically applicable in working.

In attempting to establish a standard for general use, it must be borne in mind that grading by screens can never be scientifically accurate for comparative purposes, even if the openings are in every case specially measured. The difference in character of ores, personal handling of screens, and the wear of screens, all introduce elements of uncertainty. These variations, however, do not affect the practical utility of grading tests, nor their use (in reason) for comparative purposes, if the great variations due to differing gauges of wire be eliminated.

As 150-mesh (or perhaps 200-mesh) is the practical limit of sizing by screens, the method of grading below this seems to be confined to water classification; and in this connection, the limitations of the term 'Slimes' are worth consideration; since neither mere size of particles, nor length of time in suspension, gives full information as to physical conditions for purposes of comparison. The present inquiry affords an opportunity of inviting expressions of opinion as to the desirability, and possibility, of establishing one generally accepted definition of the term 'Slimes' when allowance is made for the variations which must exist with different ores, and different systems or treatment, in the practical working line of division betwen sands and slimes.

It is requested that the enclosed series of questions be answered, signed, and returned to the secretary:

1. Do you approve of the attempt to introduce greater uniformity in the definition of grading by screens sizes?

2. Should it not always be stated whether the screening has been done wet or dry?

3. Do you agree that it is desirable to advocate the use of some standard series of screens by engineers and metallurgists as facilitating comparison of results, irrespective of how the screens may be described?

4. Do you approve of the continuance of present use of the number of openings (or mesh) in a given length or area of screen, as a definition of the screen?

5. Or is it desirable, in your opinion, that screens should be defined by the exact size of their openings, irrespective of the number of these?

6. If your answer to No. 4 is in the affirmative, then in defining a screen by the number of its mesh, is it in your opinion preferable to take the unit of measurement by length, or area; for example, 35 holes to lineal inch or 1,225 to square inch?

7. If your answer to No. 5 is in the affirmative, would you suggest the standard of measurement of openings to be in decimals of an inch, or in millimeters?

8. Do you approve of the table of suggested Standard Screens given in enclosed circular? If not, kindly attach to this paper a list of what you consider preferable, or a correction of any of the sizes given.

9. Have you any suggestions as to the further classification of material that will pass the finest screen of a standard series to be adopted, say 150 or 200 holes to lineal inch?

10. Is it desirable to attempt a more exact definition of the term 'Slimes' than is now generally understood, and if so please give your ideas as to such definition?

11. As any definition of 'Slimes' is likely to depend on water or air classification, is it in your opinion desirable to advocate the general use of three terms such as 'sand,' 'fines' and 'slimes,' to describe by the first the sizes subject to classification by screens, by the second a material too fine for screen sizing but readily settling in water and permeable to water, and by the third the finest sizes which are usually understood by the term 'Slimes'?

12. If your reply to No. 11 is in the affirmative, have you any suggestions as to the terms desirable to use, and the divisions to be recommended between them?

13. As the above suggestions are simply to facilitate the collection of opinions, any additional suggestions bearing on the subject of standardization of screens and screen tests will be appreciated.

Old and New Methods.

Apropos of the really valuable, but sensationally journalized, discoveries in radiology, the editor of *The Electrical World and Engineer* expresses himself in a current issue as follows: "It is now near two and a half centuries since Isaac Newton, in one of the flashes of intuition that form man's best title to immortality, saw disclosed to him the key to the mysteries of space. It was half a lifetime later when, through years of patient study and waiting, data enough had come to his hands to clear his conscience in announcing his discovery. For very Truth's sake he gave to the world no half-baked hypothesis nor ventured to exploit with specious arguments a doctrine which did not quite meet all the facts. We do things differently nowadays. How would the great discoverer have fared had he occupied the chair of physics at ——— University, where a monthly blank is forwarded to heads of departments to be filled out with reports on the 'researches' they have completed and the number of lectures they have given before women's clubs? Would he have held his peace, or would he have sent for a reporter of the *Daily Saffron* and have filled him full of speculations on the bounds of space and the origin of life? Would he have cut up his great hypothesis into stove lengths, as it were, to furnish his hustling pupils fuel for frying their theses? Would we have had Prof. I. Newton and Thomas Snoobs, B.S., 'On Gravitation in Jupiter,' and Prof. I. Newton and Richard Roe, A.B., 'On Gravitation in the Saturnian System,' and so on *ad nauseam?* And would the President have sacked him for insinuating that something in the universe had a more consistent pull than the Chief Benefactor?"

Blende, or zinc sulphide, ore was first mined in Silesia about 1870. It is now the chief supply of ore in that district.

To make a ton of pig iron requires, in round figures, 1½ to 2 tons of ore, ½ ton of limestone and 1 ton of fuel. That is, from 2½ to 3 tons of material must be handled and put into the furnace. At the same time, 1 ton of iron and more than an equal weight of slag must be taken out of the furnace and handled also.

It has been a question often discussed in the iron industry, whether it is better to carry the ore to the fuel, or the fuel to the ore. In the United States the practice—based on experience—is to carry the ore to the fuel. Our great blast-furnaces are near the coal mines or coke ovens of Pennsylvania, not by the ore mines of the Lake Superior district.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

The Metric System in Australia.

Sir—Recent advices from Australia show that one of the new bills to be introduced in the coming session of the Commonwealth Parliament is to deal with weights and measures. This bill, on the lines of that recently passed by the New Zealand Parliament, under which a proclamation may at any time be issued giving effect to the metric system throughout the colony from the beginning of next year, has been under the consideration of the Minister of Commerce. He has issued instructions that the principle shall be included in the new bill and that a similar provision to that included in New Zealand, giving the metric system effect from a date to be proclaimed, shall be embodied. This will provide not only an interesting but revolutionary departure. The powers to be contained in the measure have not yet exactly been defined. The system is for a time to be permissive, but power is reserved to give it compulsory effect after a day fixed by the Governor-General in Council. At one time in the Federal Parliament there was a suggestion that the metric system of weights and measures and decimal system of coinage should be introduced concurrently. This has not been found to be practicable. In any case, New Zealand has forestalled the Federation on weights and measures, and stimulated it into action before it was intended that anything should be done.

E. JOHNSON,
Secretary Decimal Association.

London, May 29, 1905.

The Eight-Hour Day in the Anthracite Mines.

Sir—Mr. John Mitchell, the president of the United Mine Workers' Union, in a speech that he made at Moosic last week, definitely formulated his demand for an eight-hour day for miners in the anthracite regions. He says that he will insist upon it when the present agreements between the miners and operators have lapsed. Only by an annual arrangement between the operators on the one hand and the representatives of the miners on the other, such as now exists in the bituminous coalfields, can, he thinks, industrial peace be preserved in the anthracite regions. Stripping Mr. Mitchell's speech of its verbiage, he places as the irreducible minimum of the demand of the miners, that the Union shall be recognized as a co-ordinate body in the exploitation of the coal industry of the anthracite measures.

Mr. Mitchell has begun a preliminary campaign throughout the mining districts of northeastern Pennsylvania. Whatever phase of mining affairs he may harp on, his ulterior object will be merely the inculcation of enthusiasm for a united demand for the recognition of the Miners' Union. The insistence on an eight-hour day for miners would be farcical, were it not so ominous. No one knows better than Mr. Mitchell and his advisory board of district presidents, that there is not a miner in the anthracite coalfields who is compelled to work eight hours a day as the condition of his employment. No man knows better than he does, from his general knowledge of labor customs prevailing in the anthracite country, that the great majority of the miners do not average six hours a day; that a considerable minority of them work only about four hours a day, and that, at mines where there are slopes and drifts, hundreds of miners do not even average four hours a day, one day with another. The laborers work longer hours, but their direct employers are the certified miners themselves, who employ them and discharge them. The officials of the mines have no direct control over the laborers, and did not even pay them prior to the award of the Commission.

Mr. Mitchell is not hankering for an eight-hour day for miners, who do not work eight hours a day or anything approximating to it; nor would he, nor could he, bind the miners to such an arrangement if the operators accepted the stipulation literally tomorrow. An eight-hour day for miners in Mr. Mitchell's philosophy is something very different from its accepted meaning as an economical factor in its industrial acceptation. Mr. Mitchell demands that no man or boy working in or around the mines shall work longer than eight hours without the sanction of the Union; but in his terminology an eight-hour day does not connote eight hours' work. Far from it. He will insist that firemen, hoisting engineers, pump-runners, motor-men and others, who are now uncircumscribed in the hours in which they work, shall conform to the regulations to be made by the officials of the Miners' Union, and that the coal operators must enter into an agreement that they will act in accordance with the statutory regulations that the executives of the Union think it well to enforce.

Mr. Mitchell's demand for an eight-hour day has deceived the public before and will deceive it again, unless it is plainly set forth for what it is. No one disputes, the operators least of all, that eight hours' work in mines is as much as human flesh and blood can stand if continued systematically. But the mines are making, and have made, no such demand for themselves or for their laborers. They are not foolish enough, left to themselves, to claim in theory what has been conceded to them as an immemorial custom. The operators have not the least objection to the miners stipulating that they will only work eight hours a day. They have said so. They would be glad of it if the miners did work eight hours a day. There would be fewer accidents, less docking, and less general dissatisfaction. It is altogether another matter if the eight hours a day at the mines were to convey with it not merely a curtailment of the hours worked supposititiously by men who cut coal, but by the men upon whom the care and responsibility of keeping the mines in perfect operating condition depends—men who are paid high wages, and who are content and faithful to their personal obligations and the corporate interests of their employers. These men have been placed in their present positions by a process of natural selection. The man who wheels the ashes from the fire becomes in turn a fireman, the fireman becomes the engineer, and so on. It is not that the training of these men is of a highly technical character, but that their knowledge, as far as it extends, must be unquestionable; their reliability must be proved by years of experience in one position, and, above all, their allegiance undivided. The character of the men for whom Mr. Mitchell is so solicitous to secure an eight-hour day will be better understood when it is stated that not 2% of them responded to his call to throw up their permanent positions during the last strike.

Mr. Mitchell is seemingly under the impression that anthracite coal is sufficiently profitable or—what amounts to the same thing—sufficiently cheap to bear any burdens that he thinks it necessary to pile upon it in the interest of his union. The price of hard coal has risen 10% since the Miners' Union became an economic factor in the anthracite regions. It will not bear more. The practical expense of the miners has brought home to them, as Mr. Mitchell himself admits, a realization of the fact that high wages do not mean cheap living.

Mr. Mitchell's speech, ingenuous as it is, cannot conceal the fact that if there is to be a strike next year, its inception must be attributed to the determination of the Miners' Union to obtain official recognition from the operators.

MINE OPERATOR.

Pottsville, Pa., June 7, 1905.

A modern blast-furnace, in regular operation, uses from 3,000,000 to 5,000,000 gal. water per day of 24 hours. The water must be of good quality. Water supply and pumping plant are therefore important items to a furnace.

The largest cargo ever carried on the Lakes was taken from Escanaba on May 30, by the steamer *Gary*. It was 12,003 long tons of iron ore, for South Chicago. The vessel's draft was 21 ft. The *Gary* is 569 ft. long over all, 549 ft. keel, 56 ft. beam, and 31 ft. deep.